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CATALOGUE

OF

BRITISH HYMENOPTERA

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THE COLLECTION

OF THE

BRITISH MUSEUM.

BY

FREDERICK SMITH, M.E.S.

BRIT. BEES

1855

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PART I.

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PREFACE.

THIS Catalogue contains descriptions of all the species of BEES which have hitherto been found in Great Britain, with some account of the habits of the genera and the peculiar economy of individual species, at the same time indicating their localities. Considerable attention has been devoted to the synonyma; and to ensure accuracy in the nomenclature, British examples have been compared with authentically-named continental specimens.

The species contained in the British Museum are indicated by the letters B.M. at the end of the description.

JOHN EDWARD GRAY.

British Museum,
1 May, 1855.

CATALOGUE

OF THE

BEES OF GREAT BRITAIN.

Tribe IV. ANTHOPHILA, *Latr.*

PIEZATA, PT., *Fabr.*

Consisting of two sexes in all the solitary species, males and females, to which another is added in the social ones, usually called a neuter, abortive female, or worker; the females and workers, excepting in the case of the hive and parasitic bees, furnished with apparatus for conveying pollen, and armed with a sting; possessing antennæ, twelve-articulate in the females and workers, and thirteen-articulate in the males; the abdomen of the females having six segments or rings, that of the males consisting of seven; all possessing four variously veined wings; two compound eyes placed laterally on the head, and three simple eyes (*stemmata*) on the vertex; the tongue obtuse, lanceolate, or filiform; all in their larva state feeding on pollen or honey, stored up by the parent. Some parasitical, consuming the food stored up for the legitimate inhabitant of the nest.

Fam. 1. Andrenidæ.

ANDRENETÆ, *Latr. Gen. Crust. et Ins.* iv. 147.
ANDRENIDÆ, *Leach, Sam. Comp.*

This family may very conveniently and appropriately be divided into two subfamilies, as proposed by Westwood in his Introduction: namely Obtusilingues, and Acutilingues; to the former only the two first genera belong, they having the tongue resembling that of a wasp, whilst the remaining genera have that organ more or less lanceolate at the apex.

Subfamily 1. OBTUSILINGUES, *Westw.*

Genus 1. COLLETES, *Latr.*

Apis, pt., *Linn. Syst. Nat.* i. 953 (1766).
Andrena, pt., *Fabr. Ent. Syst.* ii. 307 (1793).
Megilla, pt., *Fabr. Syst. Piez.* p. 328 (1804).
Melitta, pt., *Kirby, Mon. Ap. Angl.* i. 130**a* (1802).
Colletes, *Latr. Hist. Nat. Ins.* xiii. 359 (1805).
Evodia, *Panz. Krit. Revis.* p. 208 (1806).

Head subtriangular, as wide as the thorax; the mentum thrice the length of the labium or tongue, the apex bilobed; the paraglossæ nearly as long as the labium, rounded at their apex; the labial palpi four-jointed, the joints subequal; the maxillary palpi six-jointed; the stemmata placed in a line on the vertex. The wings with one marginal, and three complete submarginal cells.

The economy of the insects which compose the present genus has been frequently quoted from the interesting history given by Reaumur, who found them constructing their burrows in the interstices of stone walls,—the spaces between the stones no doubt being filled with earth or some soft kind of mortar; they are found burrowing in light sand-banks. One species, *C. Daviesana* of Kirby's MSS., is extremely abundant in many sandy districts, particularly in the county of Kent; where, as I learnt on having an opportunity of examining Mr. Kirby's own interleaved copy of 'The Monographia,' he himself had observed it, near Maidstone. The burrows of these insects are from 8 to 10 inches in length; they are lined at the further end with a very thin transparent membranaceous coating, resembling gold-beater's skin: the insect having stored up a sufficient supply of pollen and honey in a semi-fluid state, closes up the cell with a cap of the same substance as the lining of the tube; this cap is stretched

flat across, like the parchment on a drum-head; a little within she next constructs a concave cap, serving as the end of the cell; her former labour is then repeated until she has furnished six or eight cells, when the whole is completed. There is little doubt that the same bee constructs more than one of these tubes, as there never appears any trace of a second tunnel running into the first, as may be observed in many other species of solitary bees, particularly *Halicti*, *Andrenidæ*, and *Anthophoridæ*. These bees are subject to the attacks of two parasites, one feeding upon the larvæ, the other upon the pollen; the first is a Dipterous insect, *Miltogramma punctata*; these flies are very frequently to be seen entering the burrows of the bees, and have been often bred from the cocoons of *Colletes*; the second parasite is the beautiful little bee, *Epeolus variegatus*, which has been very frequently reared from the cells of *Colletes*.

These bees are gregarious, forming large colonies, particularly the *C. Daviesana*; and although their numbers are to some extent reduced by the parasites named, still their destruction by these means sinks into insignificance when compared to the wholesale slaughter committed upon them by *Forficulæ*; these omnivorous enemies devour indiscriminately pupæ, larvæ, or pollen; and in some situations they abound to such an extent, that not less than three-fourths of the bees perish through the attacks of these destructive insects.

There are four known British species of this genus, the type being the *Apis succincta* of Linnæus: the authentic specimen is preserved in the cabinet at the Linnæan Society's Museum.

1. Colletes succincta.

C. nigra, albido-villosa; thorace fulvo; abdomine ovato; segmentis margine albis.

Apis succincta, *Linn. Syst. Nat.* i. 955. 18, & *Cab. Mus. Linn. Soc. Christ. Hym.* p. 185. t. 15. f. 7.
Andrena succincta, *Fabr. Syst. Ent.* 378. 14; *Sp. Ins.* i. 474. 18; *Mant.* i. 299. 20.
Rossi, Faun. Etrus. ii. 98. 899.
Apis calendarum, *Panz. Faun. Germ.* 83. 19 ♀.
Melitta succincta, *Kirby, Mon. Ap. Angl.* ♂ ♀.
Hylæus glutinosus, *Latr. Cuv. R. Anim.* i. ed. 3. 513 ♀.
Megilla calendarum, *Fabr. Syst. Piez.* p. 335. 33 ♂.
Colletes succincta, *Smith, Zool.* iv. 1276. 1.
Evodia calendarum, *Panz. Krit. Revis.* p. 208.
Spin. Ins. Lig. ii. 197. 1.
Latr. Gen. Crust. et Ins. i. t. 14. f. 7.
Panz. Faun. Germ. 2. 1 ♂. 22 ♀.

Colletes fodiens, *Curt. Brit. Ent.* ii. f. 85.
St. Farg. Hym. ii. 298. 3.
Nyland. Ap. Boreal. 206. 2.
Reaum. Mem. vi. t. 12. f. 1–13.

Female. Length 5–5½ lines. — Black; the clypeus roughly punctured, the punctures uniting and forming striæ towards the apex; the head and thorax clothed above with pale fulvous pubescence, beneath it is griseous; the tibiæ and tarsi have also a pale fulvous pubescence, the claws ferruginous; the wings hyaline, their nervures ferruginous. Abdomen shining, the base closely punctured, more strongly than the following segments, on which the punctures are very delicate; the margin of the basal segment rufo-piceous, and having on each side a little pale fulvous pubescence; a band of short pale or white pubescence on the apical margin of each segment; the band on the basal segment passes in the middle on to the basal margin of the second. B.M.

Male. Length 3½–4½ lines.—Black; the pubescence on the head and thorax of the same colour as that of the female, the clypeus being densely covered. The abdomen is elongate-ovate, more strongly punctured than in the other sex; all the segments have a pale fulvous marginal band; beneath, the segments have a white marginal fringe. B.M.

This species resembles *C. fodiens*, but is easily distinguished by its polished abdomen and the ferruginous margin of the basal segment; the specimens described are in the finest condition, but allowance must always be made for the pubescence being more or less bleached according to age. This bee is found scattered over most parts of the country; it is found at Weybridge, Surrey; Blackwater and other parts of Hampshire; Arundel, Sussex; Isle of Wight; also in Cumberland; and Mr. Wollaston has taken it at Killarney; it has been observed to be very partial to the flowers of the heath, and indeed it appears to be most commonly met with on heaths or commons; it occurs during June, July and August.

2. Colletes fodiens.

C. nigra, albido-villosa; thorace fulvescenti; abdomine punctulatissimo, margine pallide fulvescente.

Melitta fodiens, *Kirby, Mon. Ap. Angl.* ii. 34. 2. t. 15. f. 1 ♂. 2 ♀.
Apis pallicincta, *Kirby, Mon. Ap. Angl.* ii. 295. 67 ♀.
Apis fodiens, *Fourc. Ent. Par.* ii. 444. 7?
Colletes fodiens, *Smith, Zool.* iv. 1277. 2.
Lucas, Explo. Sc. Algér. iii. 182. 90?

Female. Length 4–4½ lines.—Black; the pubescence on the face griseous, that on the vertex, and on the thorax above, is fulvous; on the cheeks and thorax beneath it is nearly white, as is also the pubescence on the legs; the wings hyaline, the nervures dark fuscous; the abdomen is fuscous, subopake, and very closely punctured, the base somewhat coarsely so; all the segments have entire fasciæ of pale fulvous, or rather, ochraceous pubescence; beneath, the margins have a pale, or white fringe. B.M.

Male. Length 3½–4 lines.—Head and thorax black, the face densely clothed with pale fulvous pubescence, the disk of the thorax ochraceous or pale fulvous; the legs beneath and the cheeks have a long dense white pubescence. Abdomen fuscous, very closely and rather strongly punctured throughout; all the segments have a pale marginal fascia, which is longer and less even than in the female; between the fasciæ is a long thin fuscous pubescence. B.M.

The sculpture of the abdomen will easily distinguish this species from *C. succincta*, with which alone it can be confounded; it is less black and shining than the latter. This bee, like the former species, is generally distributed, but it has hitherto been much less abundant, and is never found in large colonies. It is taken at Coomb Wood, also in Kent and Hampshire, and has been received from Sussex and Killarney; it is found throughout June, July and August.

3. Colletes marginata.

C. nigra, thorace pallide fulvescente, abdomine segmentis margine flavido-cinerascentibus.

Apis marginata, *Linn. MSS. in Linnæan Cabinet*, ♂.
Colletes marginata, *Smith, Zool.* iv. 1277. 3 ♂ ♀.
Colletes succincta, *Nyland. Ap. Boreal.* 206. 1.

Female. Length 4 lines.—Black; the clypeus deeply punctured, the face having a pale fulvous pubescence, most thinly scattered on the clypeus; the thorax above has a thin fulvo-ochraceous pubescence, that on the sides and beneath is much paler; the legs fusco-ferruginous, and having a thin pale pubescence. Abdomen slightly shining, delicately punctured, the punctures most strong on the basal segment, which has at the base a short pale fulvous pubescence on each side; all the apical margins of the segments have a fascia of short pubescence of the same colour. B.M.

Male. Length 3 lines.—Black ; the face densely covered with very pale ochraceous pubescence ; the thorax clothed as in the female, but the abdomen is much more strongly punctured, all the segments having pale marginal fasciæ ; the punctures on the basal segment are deep, but not very close ; beneath, the segments have a fringe of white pubescence. B.M.

This is the smallest species found in this country. I have compared British specimens with the Swedish one in the Linnæan Cabinet and find them identical ; it was first captured by Mr. Samuel Stevens at Little Hampton, Sussex, since which it has been taken in Yorkshire, and also received from Cumberland.

4. Colletes Daviesana.

C. nigra, pallido-villosula ; abdomine lævi, nitidissimo, punctis minutis sparsiori.

Melitta Daviesana, *Kirby's MSS.* ii.
Colletes Daviesana, *Smith, Zool.* iv. 1278. 4 ♂ ♀.

Female. Length 4–4½ lines.—Black ; the clypeus covered with cinereous pubescence, becoming gradually fulvous towards the vertex ; the thorax thinly clothed on the disk with fulvo-ochraceous pubescence, on the sides it is much paler, and beneath and on the legs nearly or quite white ; the wings hyaline, their nervures ferruginous. Abdomen smooth and shining, delicately punctured, most strongly at the base ; all the segments have a fascia of pale ochraceous pubescence on their apical margins, the first of which is usually interrupted. B.M.

Male. Length 3½–4 lines.—The pubescence on the head and thorax similar to that of the female ; the flagellum sometimes nigro-piceous beneath ; the abdomen oblong ovate, shining, rather more deeply punctured than the female ; the base thinly clothed with long ochraceous pubescence ; all the segments have similar fasciæ to the female, but the first is frequently obliterated, usually more or less so ; beneath, the fasciæ curve upwards from the lateral margins to the middle of the segment, but do not meet in the centre. B.M.

The greatest difficulty in this genus is to distinguish the males from each other ; that of *C. marginata* is the largest, its abdomen most convex, and its fasciæ the most white and even, with little or no pubescence between ; in *C. fodiens* the close puncturing will serve to distinguish it ; that of *C. Daviesana* may be detected

at once by examining the fasciæ on the abdomen beneath ; whilst the minute size of *C. marginata* alone will be a sufficient distinguishing characteristic.

Genus 2. PROSOPIS, *Fabr.*

Apis, pt., *Linn. Syst. Nat.* i. 953 (1766).
Hylæus, pt., *Fabr. Ent. Syst.* ii. 302 (1793).
Sphex, pt., *Panz. Faun. Germ.* fasc. 53. 1.
Melitta, pt., *Kirby, Mon. Ap. Angl.* 134*b* (1802).
Prosopis, pt., *Fabr. Syst. Piez.* p. 293 (1804).

Head subtriangular, as wide as the thorax ; the stemmata in a triangle on the vertex ; the maxillary palpi six-jointed, the labial palpi four-jointed ; the superior wings having one marginal and two submarginal cells, the second submarginal cell slightly restricted towards the marginal, the first recurrent nervure received at the apex of the first submarginal cell, the second at the apex of the second.

The bees of which the present genus is composed, being destitute of the usual apparatus for collecting pollen, were long regarded as belonging to the family of parasites. Some years ago two of the species were bred from bramble sticks, the larvæ having been exposed and found to be arranged in the same regular order as in the acknowledged industrious, or working species : this observation was made by Mr. Thwaites in 1841. Since that time I have repeatedly bred them from a similar nidus. But all doubt of their habits has been removed by the observations of Mr. Sidney Saunders, who has bred an Albanian species in great profusion : they construct their cells in bramble sticks, which they line in the same manner as *Colletes* with a thin transparent membrane, calculated for holding semi-liquid honey, which they store up for their young : the Albanian species were usually much infested by a *Stylops*. I had a very interesting nest of one of these bees given to me : the bee was observed to have chosen a hollow piece of flint stone, on breaking which a number of the silken cocoons were found, some containing perfect bees when received. Mr. Walcott has in his collection two specimens of this genus of bees, which have apparently been attacked by a species of *Stylops* ; the fact has not been previously observed in this country, but in the 'Transactions of the Entomological Society,' vol. i. new ser. p. 58, will be found an interesting account of a species of *Stylops* which attacks *Prosopis rubicola*, found by Mr. S. Saunders in Albania.

1. Prosopis communis.

P. atra; fronte maculata; tibiis posticis albido annulatis.

Hylæus annulatus, *Fabr. Ent. Syst.* ii. 305. 12 ♀.
Panz. Faun. Germ. 55. 3.
Latr. Hist. Nat. xiii. 360. 1.
Zett. Ins. Lapp. 463. 1.
Smith, Trans. Ent. Soc. iv. 29. 1; *Zool.* vi. 2202 ♂ ♀.
Melitta annulata, *Kirby, Mon. Ap. Angl.* ii. 36. 3 ♂ ♀. t. 15. f. 3.
Prosopis annulata, *Fabr. Syst. Piez.* 293. 1.
Spin. Ins. Lig. fasc. i. 112. 3.
Nyland. Ap. Boreal. 187. 1.
Hylæus communis, *Nyland. Revis. Ap. Boreal.* 234.

Female. Length 2½–3 lines.—Black; head and thorax finely and very closely punctured; the face has on each side of the clypeus an oblong angulated macula, touching the eyes, sometimes reduced to a mere line. Thorax: an interrupted yellow line on the collar, rarely obliterated; the tubercles and a spot on the tegulæ yellow, that on the former sometimes obliterated, that on the latter rarely so; the posterior tibiæ have a pale yellow ring at their base, and the extreme base of the anterior and intermediate pairs sometimes yellow. Abdomen ovate, smooth and shining. B.M.

Male. Length 1¾-2¾ lines.—Black; punctured as in the female, the thorax beneath coarsely so; the clypeus, a triangular shape above it, and the face on each side as high as the insertion of the antennæ, yellow; the sides of the clypeus sometimes black; in rare instances a yellow line in front of the scape of the antennæ; the intermediate and posterior tarsi at their base, and also the posterior tibiæ at their base yellow. B.M.

The face of this species is more triangular than that of the other species, and the yellow markings are of a deeper colour; like the rest of the species of this genus they are extremely partial to the flowers of the wild Mignonette (*Reseda odorata*), on which they are commonly found during the months of June and July.

The typical specimen of *annularis* is preserved in the Linnæan Cabinet, and differs from the present species in several particulars; it has not yet been found in this country, but it may probably occur in Scotland.

2. Prosopis annularis.

P. atra, fronte maculata; tibiis omnibus flavo annulatis.

Sphex annulata, *Panz. Faun. Germ.* fasc. 53. 1 ♂.
Melitta annularis, *Kirby, Mon. Ap. Angl.* ii. 38. 4.
Hylæus annularis, *Smith, Trans. Ent. Soc.* iv. 30. 2; *Zool.* vi. 2202. 3.
Prosopis armillatus, *Nyland. Ap. Boreal.* 189. 3.

Female. Length 2½–3 lines.—Black; head orbiculate, the clypeus truncate anteriorly, a yellow or sometimes a fulvous macula below the insertion of the antennæ, not touching the eyes; the apex of the flagellum fulvous beneath; the collar has an interrupted line, the tubercles and a spot on the tegulæ in front, yellow; all the tibiæ yellow at the base; the wings hyaline, beautifully iridescent, their nervures fuscous; the abdomen very smooth and shining, the margins of the segments sometimes narrowly rufo-piceous. B.M.

Male. Length 2½ lines.—Black, the face below the insertion of the antennæ, the scape in front and a line on the mandibles white; the flagellum, except the two basal joints, fulvous beneath; the tegulæ and extreme base of the wings fulvo-testaceous; wings subhyaline, the nervures ferruginous, the anterior tibiæ fulvous, or sometimes yellow in front, the tarsi rufo-fuscous; the posterior tibiæ have a broad ring at their base, the intermediate tibiæ more or less yellowish-white at their base; the basal joint of the posterior tarsi white; the abdomen rather more elongate than in the female. B.M.

Although this species closely resembles the *P. communis*, still it is very distinct; the form of the head alone would serve to distinguish it; and it should be observed that the markings are not yellow, but really cream-coloured. This species occurs near London, and has been taken in Hampshire; Mr. S. Stevens met with it at Arundel, Sussex.

3. Prosopis dilatata.

P. atra, tibiis flavis, nigro annulatis; antennis scapo patelliformi.

Melitta dilatata, *Kirby, Mon. Ap. Angl.* ii. 39. 5 ♂.
Hylæus dilatatus, *Latr. Hist. Nat.* xiii. 361. 2.
Curtis, Brit. Ent. viii. t. 273.
Smith, Trans. Ent. Soc. iv. 31. 4. t. 3. f. 1; *Zool.* vi. 2204. 4.
Prosopis dilatata, *Nyland. Ap. Boreal.* 188. 2.

Male. Length 3 lines.—Black; the face below the insertion of the antennæ and the scape in front cream-coloured; the mandibles are of the same colour in the middle, having their base black and their apex ferruginous; the scape of the antennæ broadly expanded, subquadrate, concave beneath; the flagellum, except the basal joint, fulvous beneath; the collar with an interrupted line, and the tubercles and tegulæ in front, white; the latter are ferruginous behind, as well as the extreme base of the wings and their nervures; the wings pale rufo-hyaline; the tibiæ, tarsi and knees pale yellowish-white; the anterior and intermediate tibiæ have a black stain behind, and the apical half of the posterior pair black; the apical joints of the tarsi pale ferruginous. The abdomen oblong-ovate, covered with a short pile, particularly on the apical margins of the segments.

This must be a very local species; we have not seen more than half a dozen specimens altogether, and only once met with it in that richest of all counties in hymenopterous insects, Hampshire, where a single specimen occurred at Hawley. We have since repeatedly searched the same locality for it in vain; Mr. S. Stevens took it at Arundel. Its female is not known.

4. Prosopis cornuta.

P. atra, fronte maculata, tibiis flavo maculatis, clypeo cornuto.

Hylæus cornutus, *Smith, Trans. Ent. Soc.* iv. 32. 6. t. 3. f. 4; *Zool.* vi. 2204. 5 ♀.

Hylæus plantaris, *Smith, Trans. Ent. Soc.* iv. 32. 7. t. 3. f. 2; *Zool.* vi. 2205. 6 ♂.

Female. Length 3¼ lines.—Black; head rotundate, a stout angular tooth on each side of the clypeus, which has its base raised, forming an elevation which passes backwards between the antennæ; the flagellum fulvous beneath, except one or two of the basal joints; a spot on the tegulæ and sometimes an interrupted line on the collar, white; the posterior tibiæ have a ring at their base, and the extreme base of the anterior and posterior tibiæ yellowish-white, the claw-joints of the tarsi ferruginous; the wings hyaline, their nervures testaceous; abdomen oblong-ovate, very bright and shining.

Male. Length 3 lines.—Black; the antennæ pale yellow, having a fusco-ferruginous line above; the front above the clypeus is raised, and the antennæ inserted on each side of the prominence; a spot on the tegulæ in front and sometimes an interrupted line on the collar, white; the wings hyaline, having a slight fulvous stain and their base yellowish; the anterior

tibiæ in front, and the intermediate and posterior pairs at their base, pale yellow; all the tarsi of that colour, with the claw-joint ferruginous; the basal joint of the intermediate tarsi dilated in front; the abdomen elongate-ovate, slightly pubescent at the apex; beneath, in the middle of the apical margin of the second segment is a depression clothed with short fulvous pubescence.

In the Kirbyan collection is a specimen of this insect without a name; but in Mr. Kirby's interleaved copy of his Monograph it is named *cornuta*, a name which I had given it before I saw the MSS. notes. A specimen of each sex was taken on Cove Common, Hants, but described as distinct species; since that time Mr. Douglas gave me some stems of the common Dock, which were evidently perforated by an hymenopterous insect; these produced both sexes from the same stem, and consequently I retain the manuscript name given by Mr. Kirby for the female of the species.

5. Prosopis punctulatissima.

P. nigra, tibiis flavo annulatis, abdomine segmentis punctulatissimis.

Hylæus punctulatissimus, *Smith, Ent. Trans.* iv. 33; *Zool.* vi. 2205. 7.

Female. Length 3 lines.—Black; the head and thorax strongly and closely punctured; the inner orbits of the eyes have a broad yellow stripe as high as the insertion of the antennæ; the tubercles, a spot on each side of the collar and another in front of the tegulæ, pale yellow; wings subhyaline, the anterior and intermediate tibiæ at their extreme base and a ring at the base of the posterior pair, pale yellow; the abdomen shining and strongly punctured, and having on each side of its apical margin a line of white pubescence; the rest of the abdomen is more finely punctured, and has a short silvery pile, observable in certain lights.

Male. Length 3 lines.—Black; the face, and the scape in front yellow; the apical half of the flagellum testaceous; the thorax punctured as in the female; a spot on the tegulæ, the anterior tibiæ in front, the intermediate and posterior pairs at their base, and the basal joint of the posterior tarsi, pale yellow; the apical joint fusco-ferruginous. Abdomen oblong-ovate, shining, closely and distinctly punctured, the margins of the segments more or less rufo-testaceous.

This species most closely resembles "*communis*," but is very distinct; its coarse puncturing, when compared with that insect, will serve to distinguish it, and it is also larger. Only once met with, on a collecting excursion at Birch Wood, Kent; which, about the years 1839–40, was an excellent locality for many hymenopterous insects, particularly that side which faces the west; but all the old uncultivated land is planted, and many species are not now to be met with.

6. Prosopis signata.

P. atra, fronte maculata; abdomine segmento primo margine utrinque albo.

Sphex signata, *Panz. Faun. Germ.* 53. 2.
Melitta signata, *Kirby, Mon. Ap. Angl.* ii. 41. 6 ♂ ♀.
Prosopis atrata, *Fabr. Syst. Piez.* 295. 10 ♂.
Hylæus signatus, *Smith, Trans. Ent. Soc.* iv. 30. 3; *Zool.* vi. 2206. 9.

Female. Length 3½ lines.—Black; the flagellum fulvous beneath; the face has on each side an angular yellow stripe, sometimes only a small spot, not reaching above the insertion of the antennæ; a line on each side of the collar, the tubercles, a spot on the tegulæ in front and the extreme base of the tegulæ, yellowish-white; the tibiæ sometimes entirely black, or only one or more pairs slightly pale at their extreme base; the anterior tibiæ usually more or less fulvous in front. The abdomen smooth, shining, and delicately punctured; the extreme lateral apical margins of the basal segment have sometimes a little fringe of white pubescence. B.M.

Var. β. The face sometimes entirely black.

Male. Length 3–3½ lines.—The face below the insertion of the antennæ white; the flagellum, except the two basal joints, fulvous; the thorax has a fine short scattered white pubescence, particularly on the sides of the metathorax and beneath; sometimes a spot on each side of the collar, another on the tubercles behind, and a minute one on the tegulæ in front, white; the extreme base of the posterior tarsi and tibiæ white; the anterior tibiæ fulvous in front; the claws ferruginous. The abdomen closely and distinctly punctured, more strongly than in the female, the basal segment having on its apical margin laterally a short fringe of white pubescence; the margins of the other segments slightly pubescent laterally. B.M.

This is the largest British species and easily distinguished. St. Fargeau is not quoted; he had so confused an acquaintance

with this genus, that he regarded all the Kirbyan species as varieties of one, including even the remarkable *P. dilatata*. This is one of the species which has more than once been bred from bramble sticks; it is very abundant, and is scattered all over the country.

7. Prosopis hyalinata.

P. atra, alis hyalinis, tibiis flavo annulatis.

Melitta annulata, *Kirby, Mon. Ap. Angl.* ii. 37, var. *β*.
Hylæus hyalinatus, *Smith, Trans. Ent. Soc.* iv. 33. 9; *Zool.* vi. 2206. 8.

Female. Length 2–3 lines.—Black; the head elongate as in "*communis*;" the flagellum, except one or two of the basal joints, fulvous beneath; the face has on each side an angular yellow spot touching the eyes, this spot varies in size in different individuals, and is sometimes almost obsolete; thorax more rotundate than that of "*communis*," shorter before the wings, very evenly punctured; a line on each side of the collar, the tubercles behind and the tegulæ in front, white; the tibiæ white at their base; the wings hyaline, splendidly iridescent, the nervures dark fuscous; abdomen ovate, smooth and shining; on the apical margin of the basal segment a little white pubescence, frequently obliterated. B.M.

Male. Length 2–2½ lines.—The face yellowish-white; the flagellum, except two or three basal segments, fulvous beneath; the anterior tibiæ in front, all the tibiæ at their base, and the tarsi, yellowish-white; the latter slightly ferruginous beyond the basal joint; the abdomen smooth and shining, and in recent specimens having a little white pubescence on each side on the apical margin of the basal segment; the sides and apex of the abdomen have a fine white pile observable in certain lights. B.M.

This species most closely resembles "*communis*," particularly the female, but it is quite distinct: the form of the thorax in this sex is a good specific difference, and the markings are much whiter than in "*communis*;" the male is readily distinguished. In the month of July this species abounds in Sandown Bay in really astonishing numbers; they are found in almost every flower of the bramble, and amongst a large number captured not an individual occurred of *P. communis* *P. signata* is found there, but not in such large numbers.

8. Prosopis varipes.

P. atra, tibiis flavis nigro annulatis; fronte maculata.

Prosopis varipes, *Smith, Cat. Hym. Ins. Brit. Mus.* pt. 1. 21. 12.

Female. Length 1½ line.—Black; head and thorax closely punctured, the antennæ yellow, the scape beneath black; a spot on the clypeus touching the apical margin and a triangular spot on each side, yellow. Thorax, the collar, tubercles, tegulæ in front, and the basal half of the tibiæ, yellow; the apical joints of the tarsi fusco-ferruginous; the metathorax covered with short white pubescence, except the enclosed portion below the scutellum, which is deeply rugose. Abdomen short, rounded, smooth and shining. The spots on the face sometimes quite, or nearly obsolete. B.M.

Male.—Black; the face below the insertion of the antennæ and their scape in front, pale yellow; the flagellum fulvous beneath. Thorax, the collar, tubercles, and tegulæ in front, tibiæ and tarsi, bright yellow; a spot on all the tibiæ behind and the apical joints of the tarsi, ferruginous; wings hyaline, splendidly iridescent. Abdomen closely and finely punctured. B.M.

This is a rare species; I never met with it at large, but have bred it from bramble and rose sticks sent from Bristol: in the British Museum are specimens from Devonshire.

9. Prosopis variegata.

P. atra, thorace maculato, abdomine rufo, apice fusco; segmentorum marginibus cinereis, tibiis albo annulatis.

Mellinus variegatus, *Fabr. Ent. Syst. Supp.* 265. 1–2.
Prosopis variegata, *Fabr. Syst. Piez.* p. 259. 9.
St. Farg. Hym. ii. 534. 1.
Lucas, Explo. Sc. Algér. iii. 223. 169.
Prosopis colorata, *Panz. Faun. Germ.* 89. 14.
Hylæus variegatus, *Smith, Zool.* vi. 2202. 1.

Female. Length 2–3 lines.—Black; a cream-coloured line on each side of the face, nearly extending to the vertex; a spot or line of the same colour on the anterior margin of the clypeus; the flagellum fulvous beneath, except one or two of its basal joints. Thorax: the collar, tubercles, and tegulæ in front, also a spot on each side at the base of the scutellum, cream-coloured; all the tibiæ at their base, the anterior pair in front and the femora at their extreme apex, cream-coloured; the apical joints of the tarsi ferruginous. Abdomen: the two basal segments fer-

ruginous, and the apical margins of the following rufo-piceous; sometimes only the basal segment red, or that, and a portion of the second red. B.M.

Male. The face, base of the mandibles and scape of the antennæ in front, white; the tibiæ and basal joints of the tarsi white.

Of this beautiful species there is a specimen in the Collection of the British Museum, captured by Dr. Leach at Kingsbridge, Devon; and amongst a number of Hymenoptera purchased of Mr. Pelerin, from the neighbourhood of Bideford, another specimen occurred; on these authorities it is believed to be a British insect; and when it is borne in mind, that amongst some hymenopterous insects which Mr. S. Stevens captured in Devon, a specimen of *Nomada armata* equally rare and local occurred, it may reasonably be hoped that some day the greater part, if not all, of the rare Devonshire insects will be found.

Subfamily 2. ACUTILINGUES, *Westw.*

Genus 3. SPHECODES, *Latr.*

Sphex, pt., *Linn. Syst. Nat.* i. 941 (1766).
Apis, pt., *Christ. Hym.* p. 153 (1791).
Nomada, pt., *Fabr. Ent. Syst.* ii. 345 (1793).
Melitta, pt., *Kirby, Mon. Ap. Angl.* i. 137**a* (1802).
Sphecodes, *Latr. Hist. Nat.* xiii. 368 (1805).
Dichroa, *Germ. Faun. Ins. Europ.* fasc. 5.

Head as wide as the thorax, body nearly naked; the tongue acute, short, not folded; the labial palpi four-jointed, the first joint nearly as long as the two following, the apical joint shortest; the paraglossæ minute; the maxillary palpi six-jointed, the basal joint short, the second twice its length, the four apical joints of about equal length, about one-third shorter than the second joint; the superior wings having one marginal and three submarginal cells: the first submarginal about as long as the two following, the second slightly narrowed towards the marginal, subquadrate, its inferior margin angulated and receiving the first recurrent nervure a little beyond the middle. The ocelli placed in a triangle on the vertex; the antennæ of the males submoniliform. The posterior legs and abdomen of the female destitute of pollenigerous apparatus.

The bees which are included in this genus have hitherto been regarded as parasites on those comprised in the genus *Halictus*,

and indeed many circumstances tend to support such a supposition; they are usually found burrowing not only in similar situations, but forming mixed colonies; the females of both genera appear some time before the males, and in fact their economy is alike. St. Fargeau places them amongst his division of parasites, immediately following his exotic genus *Rathymus*, with which they have not the slightest affinity; their only resemblance being in the distribution of the colours, black and red. The result of my observations leads to the conclusion that no species of the *Andrenidæ* is parasitic. The only apparent support of the theory of their parasitism, is the absence of the usual pollenigerous organs; such however is also the case in *Prosopis*, *Ceratina*, &c. In the year 1849 I discovered a mixed colony of the *Halictus abdominalis*, *Andrena nigro-cænea*, *Halictus morio*, *Sphecodes subquadratus* and *Sp. Geoffroyellus*; this being at a short distance from my house, I had an opportunity of frequently observing their economy; my visits to the colony were frequent, and I made close observations of the proceedings of the bees; yet notwithstanding, I could not in a single instance detect the *Sphecodes* entering the burrows of *Halictus*; those into which the former bee entered were of a smaller diameter than those of *Halictus*, in fact intermediate in size between the burrows of *H. abdominalis* and *H. morio*—too small to have admitted the female of *abdominalis*. These proceedings were observed on several occasions: no males of any of the bees were to be seen at this time, those of *Andrena* having disappeared some time, and those of the *Halicti* not being developed. On visiting the colony one cloudy morning, I was much delighted to observe the head of one of the species of bees at the mouth of most of the burrows—the female *Halicti* at their own burrows, and *Sphecodes* also at *their own*. The result of my observations of this colony led me to believe, still more firmly, that *Sphecodes* is not a parasite. Since the time when the above observations were made, I have on several occasions detected *Sphecodes* busily engaged in forming her burrow, a fact which I consider conclusive of the correctness of the opinions above stated.

1. Sphecodes gibbus.

S. aterrimus, abdomine ferrugineo, basi apiceque nigris; alis nigricantibus.

Sphex gibba, *Linn. Faun. Suec.* 413. 1658; *Syst. Nat.* i. 946. 33, & *Cab. Mus. Linn. Soc.* ♀.
Nomada gibba, *Rossi, Faun. Etrus.* ii. 63. 816.
Fabr. Ent. Syst. ii. 212. 59.
Apis rufa, *Christ. Hym.* 201. t. 17. f. 12 ♀.

Melitta sphecoides, *Kirby*, *Mon. Ap. Angl.* ii. 46. 9 ♀.
Melitta monilicornis, *Kirby*, *Mon. Ap. Angl.* ii. 47. 10. t. 15. f. 6 ♂.
Melitta picea, *Kirby*, *Mon. Ap. Angl.* ii. 48. 81 ♂, var.
Sphecodes piceus, *Wesm. Obs.*
Sphecodes gibbus, *Nyland. Ap. Boreal.* 193. 2.
Sphecodes sphecoides, *Smith*, *Zool.* iii. 1013. f. 3 ♂ & 4 ♀.

Female. Length 4–4½ lines.—Head and thorax black, the head a little wider than the thorax, strongly and closely punctured, the clypeus very coarsely so; the thorax smooth, shining, and having scattered deep punctures; the base of the metathorax coarsely rugose; the tegulæ rufo-piceous at their outer margins, the nervures fusco-ferruginous, the stigma ferruginous, the wings fuscous, their apical margins having a darker cloud. Abdomen shining red, the first segment more or less black at its base, the three apical segments black, sometimes the apical margin of the second segment black; this sex, in rare instances, has the legs red. B.M.

Var. *a*. The abdomen with the apex only slightly fuscous.

Male. Length 3–4 lines.—Black, the head rather wider than the thorax, the face covered with silvery-white pubescence; the antennæ as long as the head and thorax, submoniliform; thorax and wings as in the female; the second, third, and basal margin of the first segment red; the apical margin of the second usually more or less black; or the second and third segments having each a central black band, sometimes only one of these bands present. The metathorax coarsely rugose, not having a distinctly enclosed space at its base. B.M.

After a careful examination of the type specimen in the Linnæan Cabinet, this appears to be the true *Sphex gibba* of Linnæus; it is very distinct from the *Nomada gibba* of Fabricius, although closely resembling it. The *Sphex gibba* of Linnæus has been mistaken for an insect belonging to the fossorial Hymenoptera; Scopoli appears to have led the way, and all subsequent authors have followed him; Kirby distinctly says in his 'Monographia' that Linnæus's insect is synonymous with his *Melitta sphecoides*, but the observation has been overlooked hitherto: the first describer of the *Pompilus* (*Sphex*) *gibbus* of authors is Scopoli.

2. Sphecodes rufescens.

S. ater, abdomine ferrugineo, apice nigro.

Apis rufescens, *Fourc. Ent. Par.* ii. 447. 17.
Apis gibba, *Christ. Hym.* p. 183. t. 15. f. 3.
Nomada gibba, *Fabr. Ent. Syst.* ii. 348. 12 ♀, & *Cab. Mus. Dom. Banks.*

Melitta gibba, *Kirby, Mon. Ap. Angl.* ii. 42. 7.
Sphecodes gibba, *Latr. Hist. Nat.* xiii. 368.
St. Farg. Hym. ii. 542. 3. t. 24. f. 1 ♀, f. 2 ♂.
Smith, Zool. iii. 1012. 1.
Sphecodes pellucidus, *Smith. Zool.* iii. 1014. 3 ♂ ♀ (var. ?)
De Geer, ii. 7, 55. t. 32. f. 6.—Proabeille noire et rousse.

Female. Length 4–4½ lines. — Head and thorax black and shining, closely and finely punctured; head about the same width as the thorax, the flagellum testaceous beneath, the face having a scattered short griseous pubescence; the disc of the thorax not so closely punctured as the head, the metathorax having at its base a semicircular rugose enclosed space; wings fusco-hyaline, the nervures black, the anterior tibiæ slightly ferruginous in front; the apical joints of the tarsi ferruginous; the abdomen shining, delicately punctured, the sixth segment and apical margin of the fifth black. B.M.

Male. Length 3–3¾ lines.—Coloured as in the female, differing only in having the base of the abdomen more or less black, in rare instances the apex only black; the face clothed with white pubescence; the wings clearer than in the female; the antennæ not so long as the head and thorax, slightly submoniliform. B.M.

This species is equally abundant with the preceding and is found in great numbers in the autumn, frequenting various flowers, but particularly thistle-heads; it is readily distinguished from the *S. gibbus* by its having its thorax much more finely punctured, and by the colour of its wings; its head is not proportionably so wide, and the antennæ of its males are shorter.

3. Sphecodes subquadratus.

S. ater, capite magno subquadrato, abdomine ferrugineo, apice nigro.

Sphecodes gibbus, *Wesm. Obs.*
Sphecodes subquadratus, *Smith, Zool.* iii. 1014. 5. f. 5.

Female. Length 4–4½ lines.—Head and thorax black, the former subquadrate, closely and finely punctured; thorax sparingly punctured on the disc; the wings subhyaline towards their base, their apical margins having a fuscous cloud; the apical joints of the tarsi ferruginous; the abdomen red, having the apical segments black. B.M.

Male. Length 3–3½ lines.—Coloured as in the female, but much more closely punctured on the disc of the thorax; the head slightly but not so decidedly subquadrate as in the female; the

wings hyaline, very faintly clouded at their apical margins; the antennæ submoniliform; abdomen red, black both at the base and apex. B.M.

I had the good fortune to discover a colony of this insect, and by watching it until the time when the males usually appear, at length succeeded, in the month of August, in capturing both sexes in the nest; the females are readily distinguished by their subquadrate heads from all the other species: the males are not so easily distinguished; they most closely resemble those of *S. gibbus*, but their heads are not wider than the thorax, the antennæ proportionably shorter, and the wings are not fuscous as in that species.

This local insect has been found at Charlton in Kent, at Camberwell, and in Yorkshire; but it is a rare species, and seldom met with.

4. Sphecodes ephippia.

S. ater, abdomine rufo, apice pedibusque nigro-piceis; mandibulis, tarsis, tibiisque anticis, rufescentibus.

Sphex ephippia, *Linn. Syst. Nat.* i. 944. 22, fide *Cab. Mus. Linn. Soc.* ♂.
Andrena Potentilla, *Faun. Germ.* 46. 14.
Melitta divisa, *Kirby, Mon. Ap. Angl.* ii. 49. 12 ♂.
Melitta Geoffrella, *Kirby, Mon. Ap. Angl.* ii. 45. 8 ♀, t. 15. f. 5 ♀.
Sphecodes Geoffrellus, *St. Farg. Hym.* ii. 544. 4.
Wesm. Obs. p. 7. 3.
Nyland. Ap. Boreal. 194. 3.
Smith, Zool. iii. 1014. 5 ♂ ♀.
Sphecodes divisus, *Smith, Zool.* iii. 1015. 6 ♂ ♀.
Apis nigra, abdomine rufo nitida, incisuris nigris, *Geoff. Ins. Par.* ♂.

Female. Length 2½–3 lines.—Head and thorax black, shining, delicately punctured, closely so on the head, but scattered on the disc of the thorax; the flagellum, except a few of the basal joints, fulvous beneath; the wings subhyaline, splendidly iridescent, the nervures and tegulæ rufo-testaceous; the legs fusco-ferruginous, the knees and the tarsi pale ferruginous.

Male. Length 1 2¼ lines.—This sex is coloured the same as the female, but is more strongly punctured on the head and thorax; the antennæ submoniliform, the flagellum fulvous beneath; the abdomen more or less black at the base and apex, having sometimes an immaculate red space between, or one or two transverse black fasciæ.

The size alone would serve to distinguish this little bee from its congeners, but it is subject to very considerable variety; the female has sometimes the extreme base, as well as the apex of the abdomen black, and the head occasionally subquadrate; the legs are sometimes nearly black. The males vary much in the degree of colouring in the legs, specimens occur with them pale testaceous-red; the abdomen also varies much in its markings: I formerly considered it to constitute two species, but I have satisfied myself since that it is only a variable insect. In the Linnæan Cabinet is the authentic specimen of the *Sphex ephippia* of Linnæus, one of the varieties of this insect. The *M. divisa* of Kirby is a dark example of the male, having the antennæ black, but they are usually more or less fulvous beneath; but in truth it is almost impossible to decide whether the latter variety be not in reality a very minute male of *S. gibbus*: many of the Kirbyan specimens preserved in the Entomological Society's Museum are now in a very decayed condition.

5. Sphecodes fuscipennis.

S. ater, abdomine ferrugineo, alis nigricantibus.

Dichroa fuscipennis, *Germ. Faun. Ins. Europ.* fasc. 5. t. 18.
Sphecodes Latreillii, *Wesm. Obs.*
Sphecodes nigripes, *St. Farg. Hym.* ii. 542. 2.
Lucas, Explo. Sc. Algér. iii. 222. 168.
Sphecodes rugosa, *Smith, Zool.* vi. 2208.
Apis rufa, *Sulz. Hist. Ins.* 198. t. 27. f. 14?

Female. Length 5–6 lines.—Head and thorax black, strongly and closely punctured, the face thinly covered with griseous pubescence; the vertex and thorax have a little scattered black pubescence; the abdomen red, the apex nigro-piceous; the legs black, their pubescence black; the wings dark fuscous and having a violet iridescence. B.M.

Male. Length 4½–5 lines.—Black, the head a little wider than the thorax, the face densely clothed with silvery-white pubescence; the antennæ submoniliform; the thorax coarsely punctured, the metathorax rugose; the wings subfuscous, their apical margins clouded, their nervures ferruginous; the legs have a silvery pubescence, the apical joints of the tarsi ferruginous. Abdomen red, strongly punctured, the apical margins of the segments smooth and shining. B.M.

This species is included in the British Bees, on the following authorities: there are two specimens in the British Collection at the British Museum, said to have been captured by Dr. Leach

at Kingsbridge, Devon; two specimens were found amongst a collection of British insects taken at and near Bideford in Devonshire; it is common in many parts of the South of France, but does not apparently occur near Paris, nor is it, I believe, found in Germany.

Genus 4. HALICTUS, *Latr.*

Apis, pt., *Linn. Syst. Nat.* i. 953 (1766).
Hylæus, pt., *Fabr. Syst. Ent.* ii. 302 (1793).
Melitta, pt., *Kirby, Mon. Ap. Angl.* i. 138**b* (1802).
Prosopis, pt., *Fabr. Syst. Piez.* p. 293 (1804).
Megilla, pt., *Fabr. Syst. Piez.* p. 328 (1804).
Halictus, *Latr. Hist. Nat.* xiii. 364 (1805).
Lasioglossum, *Curtis, Brit. Ent.* x. 418 (1834).

Head subtriangular, not wider than the thorax, the stemmata placed in a curve on the vertex; maxillary palpi six-jointed, the basal joint longest, each joint decreasing in length to the apical one; the labial palpi four-jointed, the basal joint longest, as long as the two following joints, the three apical joints of about equal length; the mentum conical, its apex bidentate or emarginate; the labium lanceolate, acute; the paraglossæ about two-thirds of the length of the labium; the labrum of the females having an appendage on its anterior margin, that of the male simple and transverse. The superior wings having one marginal cell, gradually narrowed towards the apex; three marginal cells, the first nearly as long as the two following united; the second subquadrate, rather broader than long, receiving the first recurrent nervure towards its apex, sometimes uniting with the second transverse cubital nervure; the third restricted towards the marginal. Thorax ovate, the posterior tibiæ having a dense scopa, the interior calcar at the apex of the tibiæ serrated. Abdomen subovate in the females, and having a longitudinal rima on the apical segment. The males have their antennæ longer than in the females, sometimes as long as the body; their face elongate, the clypeus being usually produced, and more or less yellow at its apex; their abdomen is usually cylindric and elongate.

The economy of this genus of *Andrenidæ* does not appear to have been ascertained previous to my own observations being published in the year 1850: it is so remarkably different to that

of all other solitary bees, except of those belonging to the genus *Sphecodes*, that I am surprised it had escaped the researches of my predecessors who, like myself, "have loved to hear the wild bee's hum." It will be observed that the females of *Halictus* and *Sphecodes* make their appearance in June, and are to be found from that time until late in the autumn; but no males of these genera will be observed until long after the appearance of the females; my observations on a colony of *H. morio* will serve as the history of the whole genus, making allowance for the different periods of their appearance. "Early in April the females appeared, and continued in numbers up to the end of June; not a single male was to be found at any time: during the month of July scarcely an individual could be found, a solitary female now and then might be seen, but the spring bees had almost disappeared; about the middle of August the males began to come forth, and by the end of the month abounded; the females succeeded the males in their appearance about ten or twelve days: these industrious creatures immediately began the tasks assigned to them, burrowing and forming their nests; one of their little tunnels had usually others running into it, so that a single common entrance served as a passage to several cells, in each of which a little ball of pollen was formed and a single egg deposited thereon; the larvæ were usually ten or twelve days consuming it, by which time they were fully fed; in this state they lie until they changed to the pupæ state, when they very shortly became matured." I have reared individuals of *H. rubicundus* from the egg to the perfect insect; on the 15th of July I procured cells containing the pollen balls with an egg on each; in twelve days the larvæ were full fed; the change to the pupa state took place about the 25th of August, and during the first week of September the perfect state was acquired. The history of *Halictus*, therefore, is as follows: the males and females appear in the autumn; the latter being impregnated pass the winter in the perfect state, appearing during the following season to perform their economy, as detailed above in the case of *H. morio*. This is the result of my present observations, and I believe it to be the true history of *Halictus* as well as of *Sphecodes*. Humble Bees and Wasps pass the winter months in a torpid state, having been impregnated during the previous autumn, but amongst solitary bees I know no other genera besides *Halictus* and *Sphecodes* which resemble them in this respect.

DIV. I.—*Abdomen of the females having white abdominal fasciæ, usually more or less interrupted; the first recurrent nervure received towards the apex of the second marginal cell.*

1. Halictus rubicundus.

H. ater, rufescenti-pubescens; abdomine segmentis margine albis; tarsis tibiisque posticis fulvis.

Apis rubicundus, *Christ. Hym.* p. 190. t. 16. f. 10 ♀.
Apis flavipes, *Panz. Faun. Germ.* 56. 17 ♀.
Melitta rubicunda, *Kirby, Mon. Ap. Angl.* ii. 53. 14.
Curtis, Brit. Ent. x. t. 449.
Halictus nidulans, *St. Farg. Hym.* ii. 269. 5.
Halictus rubicundus, *Kirby, Faun. Boreal. Amer.* p. 267. 1?
Nyland. Ap. Boreal. p. 198. 2.
Smith, Zool. vi. 2041. 2.

Female. Length 4–5 lines.—Black; the face clothed with short thin pale fulvous pubescence; the labrum bearded with golden-yellow hairs; the flagellum slightly nigro-piceous beneath at its apex. Thorax: the disk clothed with fulvo-ferruginous pubescence, on the sides and metathorax it is paler; the tegulæ ferruginous, the wings subhyaline, faintly clouded at their apical margins, the nervures testaceous; the apical joints of the anterior tarsi, the intermediate pair, as well as the tibiæ above, and the posterior tibiæ and tarsi, fulvous; their pubescence of a golden-yellow; the basal joint of the posterior tarsi has a fuscous stain outside. Abdomen ovate, smooth and shining, having a little pale fulvous pubescence at the base; all the segments have a narrow white fascia on their apical margins, the first and second usually interrupted. B.M.

Male.—The apex of the clypeus and the labrum yellow; the antennæ about the length of the head and thorax, fusco-ferruginous beneath; the face has a little griseous pubescence, that on the vertex and disk of the thorax is faintly yellowish; the tibiæ and tarsi yellow, the former having a dark stain beneath. Abdomen elongate, the first four segments having a narrow white fascia on their apical margins, the first three interrupted. B.M.

This is probably the most widely distributed species of the genus; it is found in every part of the United Kingdom, and is scattered throughout Europe. The specimens from North America very closely resemble our insect, but are scarcely identical; they have the abdomen more closely punctured; Mr. Kirby considered them the same; the species is described by Say as *H. parallelus*; if distinct, the similarity is very striking.

2. Halictus xanthopus.

H. niger, rufo-pubescens; thorace ferrugineo; abdomine segmentis utrinque basi pallidis; pedibus posticis fulvis.

Melitta xanthopus, *Kirby, Mon. Ap. Angl.* ii. 78. 34 ♂ ♀.
Lasioglossum tricingulum, *Curtis, Brit. Ent.* x. t. 14 ♂.
Halictus xanthopus, *Brullé, Expéd. Morée*, iii. 349. 769.
St. Farg. Hym. ii. 273. 10.
Smith, Zool. vi. 2173. 25.
Nyland. Revis. Ap. Boreal. p. 238. 3.

Female. Length 5–5½ lines.—Black; the clypeus produced and shining, the tips of the mandibles ferruginous; the disk of the thorax sparingly clothed with rufo-fulvous pubescence, most dense on the post-scutellum and in front of the wings; the disk shining, evenly punctured; the tegulæ rufo-piceous; the wings faintly fulvo-hyaline, slightly clouded at their apical margins, the nervures pale ferruginous; the legs have a rufo-fulvous pubescence; the posterior tibiæ and tarsi, the intermediate tarsi, and the apical joints of the anterior pair, rufo-testaceous. Abdomen ovate, shining and delicately punctured; at the base a little fulvous pubescence; on the basal margins of the second, third and fourth segments is a fascia of white pubescence, the first and second fasciæ usually much attenuated or interrupted in the middle; on the sides of the anal rima a little fulvous pubescence. B.M.

Male. Length 4½–5 lines.—The nose produced as in the other sex, the clypeus having occasionally an obscure yellow spot; the antennæ rufo-testaceous beneath. Thorax: its pubescence very thin and usually griseous, but slightly fulvous on the disk in very recent specimens; the wings as in the female; the legs also are similarly coloured; the abdomen elongate-ovate, the bands as in the other sex, but having an additional one on the fifth segment; the apex fringed with some pale yellowish pubescence. B.M.

This species has been quoted by Walckenaer as the *H. fodiens* of Latreille, but the abdominal fasciæ are placed on the basal margins of the segments, whereas Walckenaer's insect has them on the apical margins. The male is the *Lasioglossum tricingulum* of Mr. Curtis; the peculiarities in the form of the maxillary lobes, in which it differs from many of the British species, cannot be regarded as of generic value. An examination of a number of species of exotic *Halicti*, shows that many, and gradual modifications of parts, must be admitted, or this extensive genus would be split into multitudinous subgenera; at present I prefer

separating them into sections :—in the last division of the British species are placed such species as have the first recurrent nervure uniting with the second transverso-cubital nervure.

This species is local, and appears to prefer situations on the coast: it is met with plentifully at Brighton, and Ventnor in the Isle of Wight, and has been received from Arundel, Little Hampton, and Hastings.

3. Halictus leucozonius.

H. ater, cinereo-pubescens, abdominis segmentis intermediis basi albis. *Mas,* naso porrecto, apice albo.

Apis leucozonia, *Schrank, Ins. Aust.* p. 406. 319 ♀.
Rossi, Mantis. p. 319.
Melitta leucozonia, *Kirby, Mon. Ap. Angl.* ii. 76. 33 ♂ ♀.
Halictus leucozonius, *St. Farg. Hym.* ii. 275. 13.
Smith, Zool. vi. 2171. 21.
Nyland. Ap. Boreal. p. 119. 3 ; *Revis. Ap. Boreal.* p. 240. 8.

Female. Length 4–4½ lines.—Jet-black; the clypeus produced, the face on each side has a little cinereous pubescence, the mandibles ferruginous at their apex. Thorax thinly clothed on the disk with pale fulvous pubescence, the metathorax rugose, and having a subdefined space at the base longitudinally rugose; the tegulæ dark rufo-piceous; the wings hyaline, beautifully iridescent, the nervures ferruginous; the legs have a cinereous pubescence, the posterior pair having their scopæ slightly fulvescent; the apical joints of the tarsi ferruginous. Abdomen subovate, shining, closely and finely punctured, the second, third and fourth segments have on their basal margins a band of short snow-white pubescence, the first band usually interrupted ; the apex has a little pale fulvous pubescence. B.M.

Male. Length 3-3¾ lines.—Black ; the face clothed with white pubescence, the apex of the clypeus white, the mandibles ferruginous at their tips ; the thorax punctured as in the female ; the wings clear hyaline and splendidly iridescent; the basal joint of the four posterior tarsi white, covered with a white glittering pubescence, the claws ferruginous. Abdomen oblong-ovate, convex above, uniformly punctured and having a thinly-scattered cinereous pubescence, the second and third segments have usually on each side on their basal margins a patch of white pubescence ; these are frequently obliterated. B.M.

This is a very abundant species, and is found in most parts of the country ; in the month of August this bee occurs in great

profusion, and males are sometimes taken as late as the 27th of October: it is very plentiful in the London district.

4. Halictus zonulus,

H. ater, pallide rufo-pubescens; abdominis segmentis basi lævibus. *Mas,* pedibus posticis totis nigris.

Halictus zonulus, *Smith, Zool.* vi. 2171. 22 ♂ ♀.
Nyland. Revis. Ap. Boreal. p. 241. 9.

Female. Length 4½–5 lines. — Jet-black; clypeus moderately produced, ciliated with pale fulvous pubescence, the face has a thinly scattered ochraceous pubescence; the thorax strongly and closely punctured, the metathorax rugose; the tegulæ nigro-piceous; the wings subhyaline, faintly clouded at their apical margins, the nervures ferruginous; the pubescence on the thorax and legs fulvous, brightest on the tarsi and posterior tibiæ. Abdomen subovate, shining, the base impunctate, otherwise finely punctured; the second and third segments have on each side a little short white pubescence on their basal margins, the fourth sometimes has an indistinct narrow white band; the extreme apex pale fulvous.

Male. Length 3¾–4 lines.—Black; the face clothed with short white pubescence; the clypeus scarcely produced, having a transverse white spot at the apex, sometimes obliterated; the thorax has a thin pale ochraceous pubescence; the wings as in the female; legs black, the claws ferruginous. Abdomen oblong-ovate, otherwise as in the female. B.M.

This species very closely resembles *leucozonius,* but the abdomen is less pubescent and more finely punctured, the base being impunctate; the male is distinguished by its black legs and less produced nasus, which is frequently black; the insect is also larger.

This bee is found on Plumstead Common in August, and has been received from Bristol and Scotland. Dr. Nylander says it occurs both in Denmark and Sweden.

5. Halictus quadricinctus.

H. ater; cinereo-subpubescens; abdomine convexo, segmentis margine albis; pedibus anoque pallido-villosis.

Hylæus quadricinctus, *Fabr. Ent. Syst.* ii. 303. 3; *Syst. Piez.* 319. 1 ♂?

Melitta quadricincta, *Kirby*, *Mon. Ap. Angl.* ii. 303. 3.
Halictus quadricinctus, *Smith*, *Zool.* vi. 2040. 1.
Nyland. Ap. Boreal. 198. 1.
Halictus sexcinctus, *St. Farg. Hym.* ii. 268. 4.

Female. Length 4½ lines.—Black; the face thinly clothed with pale yellow pubescence, the labrum has a beard of the same colour, the flagellum piceous beneath; the thorax thickly punctured, a thinly scattered ochraceous pubescence on the disk; the sides, the metathorax and beneath more thickly clothed with pubescence of a lighter colour; the tegulæ piceous; the wings subhyaline, the nervures testaceous; the legs nigro-piceous, their pubescence pale ochraceous, the tarsi pale ferruginous. Abdomen fuscous, convex, ovate and shining, finely and closely punctured; the apical margins of all the segments have a narrow white fascia, the first usually interrupted; at the apex a little pale ochraceous pubescence, the anal rima slightly ferruginous. B.M.

Male. Length 4 lines.—The face clothed with white pubescence, the apex of the clypeus yellow. The mandibles very much dilated at their base; the antennæ fulvous, as long as the head and thorax, slightly fuscous toward their base above, the apical joints pellucid; the tegulæ testaceous; the wings hyaline; the posterior femora, except at their apex, the intermediate and anterior pairs behind, nigro-piceous; otherwise pale fulvo-testaceous. Abdomen elongate, shining and closely punctured; all the apical margins of the segments have narrow white marginal fasciæ, the two first sometimes interrupted; the two apical segments concave beneath. B.M.

It admits of considerable doubt whether this insect is synonymous with that of Fabricius, who makes no mention of the yellow nasus, or dilated mandibles; in fact, his description would suit three or four European species. Specimens have been received from the continent, under the names of *sexcinctus* of St. Fargeau, and *nidulans* of Walckenaer. Mr. Kirby, on the authority of Dr. Latham, quotes this bee as a species of the London district, but as no one has met with it since, there is probably some mistake. Mr. Dale took the female in the Isle of Portland some years ago, with the exception of which, not a single specimen of either sex has been taken for many years. In Mr. Kirby's interleaved copy of the 'Monographia' is a note, "Mas: lectus a me in floribus Agerati apud Blakenham Parvum." (September 7th.)

This species occurs in North America: there are two examples of the male in the British Museum, which appear to be identical

with the British species. It is quite probable that the sexes are not correctly united. Mr. Kirby placed them together on no authority of observation.

6. Halictus sexnotatus.

H. aterrimus; pube incana; abdominis segmentis tribus intermediis basi utrinque niveo-albis.

Melitta sexnotata, *Kirby, Mon. Ap. Angl.* ii. 82. 37. t. 15. f. 7, 8.
Halictus sexnotatus, *Walcken. Mém. Halict.* p. 72.
St. Farg. Hym. ii. 273. 11.
Smith, Zool. vi. 2174. 26.
Nyland. Revis. Ap. Boreal. p. 239. 5.

Female. Length 5 lines. — Jet-black; the face has a little scattered white pubescence; the thorax very closely and finely punctured, and having a thin scattered pale pubescence; the wings subhyaline, their apical margins clouded, the nervures nigro-piceous; the scopæ on the posterior tibiæ are slightly fuscous above, the tarsi beneath pale yellow. Abdomen glossy and very delicately punctured, the base has a little white pubescence, an angular patch of short snow-white pubescence on each side of the basal margins of the second, third and fourth segments, those on the fourth segment frequently obliterated; beneath, the margins of the segments have a thin fringe of long white pubescence. B.M.

Male. Length 4 lines.—The pubescence as in the female; antennæ shorter than the thorax, the flagellum nigro-piceous beneath; the face covered with short white pubescence, the clypeus having a white spot at its apex. Abdomen oblong, spotted as in the other sex. B.M.

This is a species hitherto rare in cabinets. Mr. Kirby took it at Barham; the only locality where it has been recently met with is Weybridge: the female occurs there in June and September, in the lane leading to Byfleet, opposite the wood, about half a mile from the railway station; the male occurs in September: specimens have been captured at Portsmouth. This is the most beautiful species hitherto found in this country, and the exact locality is therefore pointed out.

7. Halictus 4-notatus.

H. ater; cinereo-subpubescens; abdominis segmentis duobus intermediis basi utrinque albis.

Melitta quadrinotata, *Kirby, Mon. Ap. Angl.* ii. 79. 35.
Halictus quadrinotatus, *Brullé, Exp. de Morée*, iii. 350. 773.
Smith, Zool. vi. 2173. 24.
Nyland. Revis. Ap. Boreal. p. 240. 6.

Female. Length 3–3¼ lines.—Black; head and thorax having a thin cinereous pubescence, closely and rather strongly punctured; the clypeus produced, shining, and having a few large punctures. Thorax: the tegulæ nigro-piceous; the wings subhyaline and iridescent, their nervures testaceous; the legs have a cinereous pubescence, that on the tarsi beneath fulvous. Abdomen ovate, shining, finely punctured, distantly so on the basal segment; the margins of the two basal segments slightly constricted; on the basal margins of the second and third segments laterally a little white pubescence; towards the apex covered with a short pale downy pubescence, the anal rima ferruginous. B.M.

Male. Length 2½–3 lines.—The antennæ scarcely as long as the thorax; the face has a short hoary pubescence, the apex of the clypeus and the labrum white; the mandibles ferruginous at their tips; the wings hyaline, beautifully iridescent, their nervures testaceous; all the tibiæ at their extreme base and apex, and the tarsi, yellowish-white, the claws ferruginous. B.M.

This is a generally distributed species: it is plentiful in the London district, also in the Isle of Wight, and has been received from Wales and Scotland: it is sometimes infested by a *Stylops*.

8. Halictus maculatus.

H. ater; capite vertice crasso, subquadrato; lateribus segmentorum 1–4 utrinque strigis pilosis albis.

Halictus interruptus, *St. Farg. Hym.* ii. 270. 6? (not of *Panzer*).
Halictus maculatus, *Smith, Zool.* vi. 2172. 23.
Nyland. Revis. Ap. Boreal. p. 241. 11.

Female. Length 3–3½ lines.—Black; the face thinly clothed with pale ochraceous pubescence, the clypeus coarsely punctured and slightly produced; the flagellum towards the apex nigro-piceous. Thorax: the pubescence on the disk sparing and pale ochraceous; the tegulæ piceous; the wings fusco-hyaline,

the nervures ferruginous; the pubescence on the tarsi and posterior tibiæ pale fulvous; the apical joints of the tarsi ferruginous. Abdomen oblong-ovate, shining, and very delicately punctured; on the apical margins of the segments laterally a short line of snow-white pubescence, the first frequently obliterated.

This very distinct and pretty little bee has only been twice captured; it occurred on Hawley Green, Hants: at first sight, it has a very close resemblance to *Osmia leucomelana*: the male has not been taken in England. St. Fargeau's insect is probably not identical with this, as he does not mention the remarkable subquadrate head; the male has the flagellum fulvous beneath, the margin of the clypeous yellow, and all the tarsi and tibiæ testaceous, the latter fuscous at their base; the fifth and sixth segments of the abdomen having similar spots to the female.

9. Halictus cylindricus.

H. niger, rufescenti-pubescens; abdominis segmentis marginibus fulvis, intermediis basi utrinque pallidis. *Mas*, abdominis segmentis anticis rufis, macula media punctisque lateralibus nigris.

Hylæus cylindricus, *Fabr. Ent. Syst.* ii. 302. 1 ♂; *Syst. Piez.* 319. 10.
Hylæus abdominalis, *Panz. Faun. Germ.* 53. 18 ♂.
Melitta abdominalis, *Kirby, Mon. Ap. Angl.* ii. 73. 30 ♂.
Melitta fulvocincta, *Kirby, Mon. Ap. Angl.* ii. 68. 28 ♀, & var. ♂ α, β, γ.
Melitta malachura, *Kirby, Mon. Ap. Angl.* ii. 67. 26 ♀ (var.).
Andrena vulpina, *Fabr. Syst. Piez.* p. 326. 19 ♀.
Panz. Faun. Germ. 97. 18.
Halictus terebrator, *Walcken. Mém. Halict.* p. 72 ♂ ♀.
Halictus vulpinus, *St. Farg. Hym.* ii. 276. 15.
Lucas, Explor. Sc. Algér. iii. 185. 96.
Halictus fulvocinctus, *Nyland. Ap. Boreal.* p. 199. 4.
Halictus abdominalis, *Smith, Zool.* vi. 2106. 15 ♂ ♀.

Female. Length 4–4½ lines.—Black; head and thorax closely punctured, the face thinly clothed with short fulvous pubescence; the disk of the thorax is similarly clothed, more densely at the sides; the metathorax rugose, posteriorly truncate; the enclosed portion at its base has a sharp ridge behind; the wings subhyaline, their apical margins slightly clouded, the nervures ferruginous; the tegulæ piceous; the pubescence on the legs rufo-

fulvous, the apical joints of the tarsi ferruginous, and their pubescence beneath ferruginous. Abdomen ovate, shining and delicately punctured, the margins of the segments pale fulvo-testaceous and densely ciliated with fulvous pubescence; at the base of the second and third segments laterally, a line of white pubescence, that on the apex fulvous. B.M.

Male. Length 3½–4½ lines.—Head and thorax black; on each side of the clypeus the face is covered with short white pubescence, above it is pale fulvous; the nose produced, the apex of the clypeus yellow, the mandibles ferruginous at their apex, sometimes having a yellow spot about the middle, the antennæ nearly as long as the thorax. Thorax: the disk thinly clothed with pale fulvous pubescence; the tegulæ rufo-piceous and having a yellow spot in front, the wings hyaline, iridescent and faintly clouded at their apical margins; the four posterior tibiæ at their base and apex, and a line on the anterior pair above, yellow; all the tarsi yellow, their apical joints ferruginous. Abdomen oblong-ovate; the three basal segments red, the apical ones black, the extreme base of the first segment and the apical margin of the third black; at the extreme margins of the second and third segments a black dot, and on the basal margins of each laterally, a line of white pubescence. B.M.

Var. *α*. A black spot in the centre of the second and third segments.

Var. *β*. A broad fuscous transverse stain on the second and third segments, leaving only the margins red.

Var. *γ*. The apical margins alone red, faintly so in the middle.

The *Melitta malachura* of Kirby is probably a variety of the female, having the abdominal fasciæ rubbed off. Mr. Kirby, subsequently to the publication of his work, was of the same opinion, as appears by a note in his own copy of the 'Monographia.'

The *Hylæus cylindricus* of Fabricius is the male, and the oldest name for the species. Mr. Kirby made a distinct species of the male of the description, considering the dark varieties only as the male; but the sexes have on more occasions than one been observed "*in coitu*." All these varieties belong to one species, and minuter ones might be pointed out, but that will be better done by personal observation of the insects themselves; hundreds of the males may be captured on fine autumnal days, on the Ragwort; the species is universally distributed, and has been received from Scotland, Wales, and Ireland.

10. Halictus albipes.

H. ater, glabriusculus; abdomine nitidissimo, obovato, segmentis basi albis. *Mas,* abdominis segmentis intermediis rufis, punctisque lateralibus nigris, labro clypeique apice pallide luteis.

Apis albipes, *Fabr. Mant. Ins.* i. 306. 92 ♂.
Panz. Faun. Germ. 7. 15.
Hylæus albipes, *Fabr. Ent. Syst.* ii. 306. 13.
Melitta albipes, *Kirby, Mon. Ap. Angl.* ii. 71. 29.
Melitta obovata, *Kirby, Mon. Ap. Angl.* ii. 75. 31 ♀.
Prosopis albipes, *Fabr. Syst. Piez.* p. 294. 4 ♂.
Halictus albipes, *St. Farg. Hym.* ii. 287. 31 ♂.
Smith, Zool. vi. 2167. 17 ♂ ♀.

Female. Length 4 lines.—Black; the face thinly clothed with short griseous pubescence, the flagellum piceous beneath. Thorax: very thinly clothed with very pale ochraceous pubescence on the disk, on the sides and beneath it is griseous; the tegulæ piceous; the wings fulvo-hyaline, the nervures testaceous; the metathorax truncate posteriorly, the basal portion not enclosed, but rugose-striate; beyond, slightly roughened; the tibiæ and tarsi have a pale fulvous pubescence, on the latter beneath it is bright fulvous, the apical joints of the tarsi ferruginous. Abdomen ovate, very smooth and shining at the base and in the middle of the segments, the sides, and towards the apex, covered with a short pale fulvous pubescence; at the base of the second, third and fourth segments a thin fascia of white or very pale pubescence. B.M.

Male. Length 3¼-4 lines.—The face covered with short white pubescence, the clypeus at its apex and the labrum and mandibles yellow, the latter black at the base and ferruginous at their apex. Thorax: the tubercles and tegulæ pale yellow in front; the wings hyaline, splendidly iridescent, the nervures ferruginous; the femora at their apex, the tibiæ at their base and apex, and the tarsi yellowish-white, the claws ferruginous. Abdomen elongate, widest towards the apex, the three basal segments red; the base and a quadrate patch nearly reaching the apical margin of the first segment, a short transverse patch on the apical margin of the second segment, and a similar one on the third, black; beneath, red towards the base; a black dot at the extreme lateral margins of the second and third segments. B.M.

Var. *α.* The sides and apical margins only red.

Var. *β.* The apical margin only of the basal segment red, the two following as in var. *α.*

The male assigned to this species by Mr. Kirby in the Appendix to the 'Monographia,' does not belong to it.

This species is difficult to separate from *H. cylindricus*: the female differs, first, in being much smaller, and in having the metathorax somewhat differently sculptured: in *H. cylindricus* the enclosed portion at the base has a ridge behind, which is not the case in *H. albipes*. The male of *albipes* may be known by its yellow labrum and mandibles.

This species is not so abundant as *H. cylindricus*, but is widely distributed; it has been met with in Yorkshire, and is numerous in the London district. Mr. Wollaston brought it from Killarney.

11. Halictus prasinus.

H. capite thoraceque nigro-æneis, abdomine atro, segmentis marginibus albis.

Female. Length 4½ lines.—Head nigro-æneous, the face thinly clothed with griseous pubescence, the clypeus much produced and having a few large punctures; the mandibles ferruginous at their apex. Thorax nigro-æneous, finely and very closely punctured; the tegulæ pale testaceous; the wings fulvo-hyaline, the nervures ferruginous; the legs have a yellowish-white pubescence, that on the tarsi beneath fulvous. Abdomen ovate, highly polished and finely punctured; on the basal margins of the second and third segments is a fascia of very short yellowish-white pubescence; the pubescence is beautifully plumose, or pectinate; the apical segments have a scattered short pale fulvous pubescence, the sides of the anal rima fulvous.

This species most closely resembles the female of *H. lugubris* (*lævigatus*), but, independent of the puncturing of the thorax, its colour is olive-green; the form of the head is also very different. The first specimen was received from Mr. Dale, who captured it at Bournemouth; it has been received from the Rev. W. Little, who found it at Moffat; and it has also been taken at Hawley, Hants; its male is not known.

12. Halictus lugubris.

H. ater, subpubescens; thorace pube ferruginea vestito; abdomine nitidissimo, segmentis intermediis basi pallescentibus. *Mas*, abdominis segmentis intermediis basi utrinque, tarsisque basi, albis.

Melitta lugubris, *Kirby*, *Mon. Ap. Angl.* ii. 81. 86 ♂.
Melitta lævigata, *Kirby*, *Mon. Ap. Angl.* ii. 75. 32 ♀.

Halictus fodiens, *Latr. Hist. Nat. Crust. et Ins.* xiii. 367. 3.
Halictus lævigatus, *St. Farg. Hym.* ii. 274. 12.
Nyland. Revis. Ap. Boreal. 239. 4.
Halictus lugubris, *Smith, Zool.* vi. 2169. 19 ♂ ♀.

Female. Length 4½ lines.—Black; the face thinly clothed with pale fulvous pubescence; the clypeus slightly produced, shining, and having a few large punctures, the mandibles ferruginous at their apex. Thorax shining, the punctures large and scattered on the disk, which is clothed with fulvo-ferruginous pubescence; the tegulæ nigro-piceous; the wings subhyaline, iridescent, the nervures pale ferruginous; the apical margins faintly clouded; the legs have a bright fulvous pubescence, the claws ferruginous. Abdomen smooth and highly polished; the base has a thin fulvous pubescence, the basal margins of the second, third and fourth segments have a pale fulvous fascia; the first usually, and the second occasionally, interrupted; the apical segment clothed with similar pubescence. B.M.

Male. Length 3–3¾ lines.—The face has a short white pubescence, the clypeus produced, immaculate; the antennæ as long as the thorax, which is closely punctured and has a thin hoary pubescence; the tegulæ pale rufo-testaceous, the wings hyaline and beautifully iridescent, the nervures pale rufo-testaceous; the anterior and intermediate tibiæ at their extreme base, the posterior pair at their base and extreme apex, and the tarsi, yellowish-white; the claws ferruginous. Abdomen elongate-ovate, smooth, shining and having some delicate scattered punctures; the second, third and fourth segments laterally have a small patch of white pubescence on their basal margins. B.M.

This pretty species appears to be rather local and not very abundant; it is found in the London district about Greenwich and Charlton; it is also taken in the Isle of Wight, and has been received from Scotland.

Div. II.—*Body more or less metallic; the second recurrent nervure received near the apex of the second submarginal cell.*

13. Halictus flavipes.

H. nigro-æneus, pallido-subpubescens; abdominis segmentis marginibus pallidis. *Mas* nigro-æneus, nitidus, pedibus flavis.

Apis flavipes, *Fabr. Mant. Ins.* i. 305. 89.
Hylæus flavipes, *Fabr. Ent. Syst.* ii. 305. 11 ♂.

Melitta flavipes, *Kirby, Mon. Ap. Angl.* ii. 55. 15.
Apis subaurata, *Rossi, Faun. Etrus.* p. 321. 144 ♀.
Panz. Faun. Germ. 56. 4.
Apis seladonia, *Fabr. Ent. Syst. Suppl.* p. 276. 120.
Megilla seladonia, *Fabr. Syst. Piez.* p. 334. 28.
Melitta seladonia, *Kirby, Mon. Ap. Angl.* ii. 57. 16.
Halictus seladonius, *Latr. Hist. Nat. Crust. et Ins.* xiii. 367. 4.
Nyland. Ap. Boreal. p. 203. 8.
Halictus subauratus, *Brullé, Expéd. Sc. Morée, Zool.* iii. 352. 777.
Halictus flavipes, *Smith, Zool.* vi. 2042. 3 ♂ ♀.

Female. Length 3–4 lines.—Nigro-æneous; the flagellum at the apex beneath testaceous; the thorax shining and closely punctured; the metathorax sometimes blue-green; the prothorax has an impressed line in the centre passing backwards to the middle of the disk, and on each side there is a shorter one opposite the tegulæ; the tegulæ slightly testaceous; the wings hyaline and iridescent, the nervures pale testaceous; the pubescence of the legs yellowish-white, that on the tarsi beneath golden-yellow; the apical joints of the tarsi pale ferruginous. Abdomen ovate, very closely and finely punctured; the apical margins of the segments have pale fasciæ, sometimes white, the first usually interrupted; the sides of the anal rima slightly fulvous. B.M.

Mare. Length 3–3½ lines.—Brassy-green, very closely and finely punctured, the apex of the clypeus, the labrum, and mandibles yellow, the latter ferruginous at their apex; the antennæ as long as the thorax, fulvous beneath and fuscous above, the scape black; the thorax has a central impressed line, and a short one over the tegulæ; the tegulæ yellow; the legs sulphur-yellow, the tibiæ and femora have some rufous stains; the wings hyaline and iridescent, the nervures testaceous. Abdomen elongate, shining and subclavate, the apex obtusely rounded, the margins of the segments depressed and having a thinly scattered griseous pubescence, particularly on the sides. B.M.

The male of this species very closely resembles the *A. tumulorum* of Linnæus; but Nylander says the latter is the male of his *H. fasciatus*, and also of *H. gramineus*; of the former it certainly may be, but not of the latter, of which both sexes exist in the Museum collection. In F. Smith's collection is a specimen named *fasciatus* by Dr. Nylander, but either this is a mistake, or the resemblance to *H. flavipes* ♀ is so great that it appears to be only a fresh specimen of that species. *H. tumulorum* has not yet been discovered in this country.

H. flavipes is an abundant insect, found in all parts of the country.

14. Halictus gramineus.

H. nigro-æneus, pallido pubescens; abdomine pubescente pulveroso.

Halictus gramineus, *Smith, Zool.* vii. *Append.* lviii.

Female. Length 3¼ lines.—Green, finely and closely punctured; the apical joints of the flagellum rufo-testaceous beneath; the head and thorax have a thinly scattered fulvous pubescence, palest on the face; the tegulæ honey-yellow, as well as the extreme base of the wings, which are hyaline and splendidly iridescent, the nervures pale testaceous; the anterior tibiæ, the intermediate and posterior pairs at their base, and all the tarsi testaceous, the claws ferruginous. The abdomen entirely covered with a very short pale fulvous pubescence, slightly intermixed with paler down, or scales, on the margins of the segments, giving them a subfasciate appearance. B.M.

Male.—Rather smaller than the female, similarly clothed; the antennæ not so long as the thorax, the flagellum fulvous beneath; the apex of the clypeus, the labrum and apex of the mandibles yellow. Thorax: the wings as in the female; the tibiæ and tarsi yellow; a ferruginous stain on the anterior tibiæ in front, and also a similar spot on each side of the intermediate and posterior pairs, the claws ferruginous. Abdomen ovate, scarcely longer than in the other sex. B.M.

The description of the male of this species will at once show that it cannot be the *Apis tumulorum* of Linnæus, who says, "Antennæ filiformes, corporis fere longitudine." In *H. gramineus* they are about two-thirds of the length of the thorax; the typical specimen of *tumulorum* in the Linnæan Cabinet has three or four of the apical joints of the antennæ black, or fuscous. Of this very distinct species two specimens have been taken on Cove Common, Hants; there are several in the collection of the British Museum, from Devonshire.

15. Halictus Smeathmanellus.

H. viridi-æneus, nitidissimus; abdominis segmentis intermediis basi utrinque tomentosis albis.

Melitta Smeathmanella, *Kirby, Mon. Ap. Angl. App.* ii. 375. 111.
Halictus Smeathmanellus, *Smith, Zool.* vi. 2101. 7.

Female. Length 3–3½ lines.—Bright metallic-green, closely and finely punctured; the flagellum nigro-piceous beneath, the

mandibles ferruginous at their apex; the tegulæ, nervures and extreme base of the wings testaceous, the wings hyaline and beautifully iridescent; the legs have a thin cinereous pubescence. Abdomen ovate, very glossy, and having a very thinly scattered downy pubescence; the apical margins of the segments slightly testaceous, at the basal margin of the second and third segments laterally, a patch of white pubescence; the sides of the apical rima pale fulvous. B.M.

Male.—Of the same colour as the female, the apex of the clypeus pale yellow, the antennæ as long as the thorax, the flagellum fulvous beneath, the apex of the mandibles ferruginous. Thorax: the tegulæ piceous; the wings hyaline and splendidly iridescent. Abdomen elongate, shining green, at the base of the two intermediate segments sometimes a little short white pubescence. B.M.

This is a local species, but is frequently found in the London district; it formerly occurred about Old Brompton and Hammersmith, also in the Battersea Fields, one of the best localities for insects generally, about fourteen years ago, of any spot in the neighbourhood of London.

16. Halictus æratus.

H. viridi-æneus, nitidus; abdomine nigro-æneo.

Melitta ærata, *Kirby*, *Mon. Ap. Angl.* ii. 58. 17.
Halictus æratus, *Smith*, *Zool.* vi. 2043. 4.

Female. Length 2½–3 lines.—Head and thorax brassy-green; the flagellum slightly testaceous towards the apex beneath; the thorax shining, the metathorax having at its base a subdefined space, its margin behind ridged, the space longitudinally rugose; the wings subhyaline, splendidly iridescent; the abdomen nigro-æneous, smooth and shining, the apical margins of the segments slightly testaceous; the basal margins of the intermediate segments have sometimes laterally, a little short white pubescence, frequently obliterated. B.M.

Male. Length 3 lines.—Head and thorax of a bronzed or brassy-green, antennæ nearly as long as the thorax, the flagellum fulvous beneath, apex of the clypeus pale yellow; the wings subhyaline; the tegulæ rufo-piceous. Abdomen black, slightly nigro-æneous at the base, which is very glossy; the two intermediate segments, and sometimes the third segment also, have a little white pubescence on each side at the base. B.M.

This species very closely resembles *H. morio*, but it differs both in the colour and sculpture of the metathorax, which has a subenclosed space at its base, more strongly rugose than in *H. morio*, and is of the same colour as the disk, whereas, in *H. morio*, it is of a darker green than the other parts; the male of *H. æratus* has the metathorax more coarsely sculptured, and is also a rather smaller species. It is distributed all over the country, but not so numerously as *H. morio*, colonies of which are of frequent occurrence.

17. Halictus morio.

H. æneus, metathorace cærulescenti; abdomine nigro.

Hylæus morio, *Fabr. Ent. Syst.* ii. 306. 16 ♂; *Syst. Piez.* 321. 8.
Coqueb. Illust. Icon. Ins. p. 25. t. 6. f. 5.
Melitta morio, *Kirby, Mon. Ap. Angl.* ii. 60. 19 ♂ ♀.
Halictus morio, *St. Farg. Hym.* ii. 284. 26.
Smith, Zool. vi. 2101. 6.
Nyland. Ap. Boreal. p. 204. 9.

Female. Length 2–2½ lines.—Head and thorax brassy-green, finely and closely punctured; antennæ fulvous towards their apex beneath; thorax shining, the metathorax of a blue-green, longitudinally rugose at the base, not enclosed; the wings subhyaline, splendidly iridescent, the nervures testaceous; the tegulæ piceous; the legs have a glittering white pubescence. Abdomen ovate, black and shining, having a short scattered pale pubescence at the sides and towards the apex; the basal lateral margins of the two intermediate segments have sometimes a little short white pubescence, very frequently obliterated. B.M.

Male. Length 2⅓ lines.—Head and thorax coloured as in the female, the clypeus yellow at its apex; the flagellum fulvous beneath; the abdomen elongate, black, the margins of the two basal segments depressed; a little white pubescence on the basal margins of the second and third segments. B.M.

This is perhaps the most abundant of all the species; it is to be found frequently at the sides of old walls, and in pathways, even in streets in the suburbs of London; *Nomada furva* frequently infests its burrows. Males are found as late as the end of October.

18. Halictus leucopus.

H. viridi-æneus, abdomine nigro. *Mas*, antennis subtus fulvis; tarsis albidis.

Melitta leucopus, *Kirby*, *Mon. Ap. Angl.* ii. 59. 18 ♂.
Halictus leucopus, *Smith*, *Zool.* vi. 2101. 7 ♂ ♀.
Nyland. Ap. Boreal. p. 247. 23.

Female. Length 3 lines.—Head and thorax dark green, the clypeus slightly produced; the flagellum testaceous beneath. Thorax shining; the tegulæ testaceous; the wings hyaline, iridescent, the nervures pale testaceous; the legs have a glittering white pubescence, that on the tarsi beneath pale fulvous. Abdomen very glossy at the base, the apical margins of the segments rufo-piceous, and having a scattered pubescence towards the apex; sometimes a little white pubescence at the lateral basal margins of the second and third segments. B.M.

Male.—Head and thorax bright green, the apex of the clypeus, labrum and mandibles pale yellow; the flagellum pale fulvous beneath. Thorax: the tegulæ rufo-piceous; the wings hyaline, splendidly iridescent; all the tarsi and the base of the tibiæ pale yellow, the claws ferruginous. Abdomen black, elongate-ovate, thinly covered with short griseous pubescence; the apical margins of the two basal segments depressed. B.M.

This species is not so abundant as the two preceding, but is widely distributed; the female is so like to that of *æneus*, that it becomes difficult to point out a distinctive difference; the form of the head is perhaps the best and most obvious difference, it is much rounder, and the clypeus scarcely produced; the disk of the thorax is more strongly and not so closely punctured; the males are easily distinguished by the colouring of the tarsi. I possess specimens taken "*in coitu*," or I could not have felt certain of the sexes, although I had strong suspicions previously. These small species of *Halicti* are difficult to separate, and require attentive study and observation.

Div. III.—*Entirely black; the first recurrent nervure uniting with the second transverse cubital nervure.*

19. Halictus longulus.

H. niger, pubescentia rufo-testacea, abdomine elongato.

Female. Length 4 lines.—Black, head and thorax very closely

and finely punctured; the flagellum fulvo-piceous towards the apex beneath; the clypeus scarcely produced. Thorax subopake; the tegulæ rufo-testaceous; the wings hyaline, the nervures pale testaceous; the base of the metathorax subrugose, not enclosed; the legs are dark rufo-testaceous and have a pale fulvous pubescence, their apical joints ferruginous. Abdomen elongate-ovate, delicately punctured, the base very smooth and shining, the margins of the segments rufo-testaceous; thinly clothed with short pale pubescence, most dense at the sides and towards the apex, the margins of the intermediate segments slightly depressed; beneath, fringed with a long pale pubescence. B.M.

This species was first captured by Mr. C. Bowring, who presented specimens to the Museum; since that time it has occurred in plenty at the land-slip at Bonchurch, Isle of Wight, an excellent locality for Hymenoptera, and one of the most beautiful spots in the island. It is very distinct from all the other species, but most nearly approaches the female of *H. albipes*, from which the neuration of the wing at once separates it; the male is not known.

20. Halictus lævis.

H. ater, pallido-villosulus; abdomine nigro, lævi, nitidissimo.

Melitta lævis, *Kirby, Mon. Ap. Angl.* ii. 65. 24 ♀.
Halictus lævis, *St. Farg. Hym.* ii. 277. 16?
Smith, Zool. vi. 2104. 12.

Female. Length 3¾ lines.—Black, the head and thorax closely punctured, a little scattered fulvous pubescence on the face and disk of the thorax, on the sides of the latter it is more dense; the tegulæ pale testaceous; the wings hyaline, having a slight fulvous tinge, the nervures pale testaceous; the legs rufo-testaceous, their pubescence pale fulvous, that on the tarsi beneath pale fulvous, the tarsi ferruginous; the metathorax rugose. Abdomen ovate, widest towards the apex, very glossy, smooth and impunctate, the apical segments having a short pale pubescence; beneath, the margins of the segments have a fringe of pale pubescence.

This has hitherto been a rare species in cabinets, the type being the only known specimen until a second was taken by Mr. Dawson at Ventnor, Isle of Wight; I have myself searched the same locality, but captured *H. longulus*: I have some suspicion that the latter may be a variety, but I have not felt justified in uniting them; the typical specimen in the Kirbyan collection is

in a mutilated condition, and I had the misfortune to injure my own, I am therefore compelled to adopt the course I have done, rather than allow the strongest suspicion to influence my decision whilst a doubt remained.

21. Halictus subfasciatus.

H. ater, griseo-subpubescens, abdomine nitidissimo, segmentis pallido-subfasciatis.

Halictus subfasciatus, *Nyland. Ap. Boreal.* p. 200.

Female. Length 3½ lines. — Black, the apical portion of the flagellum fulvo-piceous beneath; the disk of the thorax finely and closely punctured, subopake; the metathorax truncate, at the base an enclosed portion which has on each side a slight ridge, and terminates posteriorly at the verge of the truncation, which is subrugose, the sculpture formed of radiating sulcations. Abdomen slightly pubescent, the apical margins of the segments have a very thin fascia of pale hairs, interrupted on the two first segments, and frequently almost entirely obsolete; the legs have pale yellowish-white pubescence. B.M.

Male. Length 3 lines.—Black, the flagellum beneath pale fulvous; the anterior tibiæ in front and all the tarsi of a reddish-yellow.

This species was added to our fauna by the capture of several specimens in 1842 in Yorkshire, a few miles from Wakefield, on a lofty hill called Woolley-edge; several insects which are common in Scotland have been found at the same locality. The name given to this bee in the Catalogue of Andrenidæ, published by the British Museum, has had its correctness confirmed by Dr. Nylander, to whom specimens were sent; he observes that the species is found in Sweden, Finland, and Lapland.

22. Halictus fulvicornis.

H. niger; antennis thorace longioribus, subtus fulvescentibus, supra subfuscis; abdomine nitido, segmentis intermediis basi albis.

Melitta fulvicornis, *Kirby, Mon. Ap. Angl.* ii. 67. 27 ♂.
Halictus fulvicornis, *Smith, Zool.* vi. 2170. 20.

Male. Length 3½ lines.—Black, the face anteriorly clothed with short white pubescence, the clypeus white at the apex, the antennæ longer than the thorax, fulvous beneath, and more or

less fuscous above. Thorax finely and very closely punctured, the metathorax rugose; the tegulæ rufo-piceous; the wings hyaline, iridescent, the nervures fuscous; the tibiæ at their base and apex, the anterior pair in front, and the tarsi yellow; the anterior tibiæ are sometimes fulvous in front; the claws ferruginous. Abdomen elongate, very smooth and shining, impunctate; the margins of the intermediate segments depressed, and having at their base laterally a little white pubescence. B.M.

Dr. Nylander suggests the probability of this male belonging to *H. subfasciatus*, which is very probable, but he does not say whether the clypeus is pale or not at the apex. I have taken this bee near London, but never met with *H. subfasciatus*; a doubt existing, they are separated. I did not find the male in Yorkshire, where I took *H. subfasciatus*, but it was perhaps too early in the season for their appearance.

23. Halictus minutus.

H. niger, valde nitidus; antennis subtus fulvescentibus.

Melitta minuta, *Kirby, Mon. Ap. Angl.* ii. 61. 20 ♂ ♀.
Halictus minutus, *St. Farg. Hym.* ii. 227. 17.
Smith, Zool. vi. 2102. 13.
Nyland. Ap. Boreal. p. 202. 7.

Female. Length 2½–3 lines.—Black; head and thorax very finely punctured; the flagellum fulvescent beneath. Thorax glossy, the wings subhyaline and iridescent, the tegulæ and nervures rufo-piceous; the metathorax rounded, subrugose at the base, beyond which is a smooth and shining space; the legs sometimes nigro-piceous, thinly sprinkled with cinereous pubescence, the apical joints of the tarsi ferruginous. Abdomen very glossy, ovate and delicately punctured. B.M.

Male. Length 2½ lines.—The antennæ as long as the thorax, subfulvous beneath, sometimes bright fulvous, the scape black; the face clothed with white pubescence; the apex of the clypeus yellowish-white, the mandibles towards their apex reddish-yellow, their tips ferruginous. Thorax shining, the wings beautifully iridescent; the apical joints of the tarsi rufo-testaceous; the abdomen elongate, the margins of the intermediate segments depressed. B.M.

The females of this species most closely resemble those of *villosulus*, but the puncturing will at once distinguish them; in *minutus* the thorax is closely and finely punctured, whilst in *vil-*

losulus the punctures are stronger and dispersed. This bee is very generally distributed over all parts of the kingdom.

24. Halictus nitidiusculus.

H. niger, glabriusculus; antennis subtus fulvis; thorace glabro punctulato, tegulis testaceis.

Melitta nitidiuscula, *Kirby, Mon. Ap. Angl.* ii. 64. 23 ♂.
Halictus nitidiusculus, *Smith, Zool.* vi. 2103. 10 ♂ ♀.

Female. Length 2–3 lines.—Black; the flagellum fulvous beneath. Thorax obscurely nigro-æneous, the tegulæ and nervures pale testaceous, the legs more or less testaceous, the tarsi rufo-testaceous. Abdomen sometimes rufo-testaceous, seldom black, very delicately punctured, and shining at the base, the margins of the segments slightly testaceous. B.M.

Male. Length 2¼–2½ lines.—The face has a fine short white pubescence; the flagellum fulvous beneath; the clypeus at the apex, the labrum and mandibles, yellowish-white. Thorax shining, the metathorax rotundate, finely roughened at the base, beyond which it is smooth and shining; the tegulæ pale, the wings subhyaline and iridescent; the base and apex of the tibiæ and the tarsi pale yellow. Abdomen elongate, shining; the three intermediate segments have beneath, on each side, a fimbria of pale hairs. B.M.

This species is frequently infested with a *Stylops*; several specimens have been taken on Hampstead Heath thus attacked.

25. Halictus interruptus.

H. ater, abdomine glabriusculo, segmento primo ferrugineo.

Hylæus interruptus, *Panz. Faun. Germ.* 55. 4.
Halictus interruptus, *St. Farg. Hym.* ii. 288. 32.
Smith, Zool. vi. 2167. 16.

Male. Length 2¾ lines.—Black; the face has a short silvery-white pubescence; the apex of the clypeus, labrum and mandibles yellow, the tips of the latter ferruginous; the flagellum fulvous beneath. Thorax strongly punctured, sometimes a lateral white spot on the collar; wings hyaline and iridescent; the metathorax rugose and rotundate. Abdomen elongate, the first segment and sometimes the base of the second red, the three following segments have a narrow interrupted white marginal fascia. B.M.

This is a species which has not been captured since Dr. Leach met with it in Devonshire, therefore no other locality than Kingsbridge in that county is known.

26. Halictus minutissimus.

H. ater, glabriusculus; abdomine nitidissimo.

Melitta minutissima, *Kirby*, *Mon. Ap. Angl.* ii. 63. 22 ♂ ♀.
Halictus minutissimus, *Smith*, *Zool.* vi. 2103. 9.
Nyland. Revis. Ap. Boreal. p. 246. 20.

Female. Length 2–2½ lines.—Black; head and thorax closely punctured; the tips of the mandibles ferruginous; the metathorax rotundate; the tegulæ piceous; the wings subhyaline and iridescent. Abdomen oblong-ovate, closely punctured and shining, the apical margins of the segments sometimes rufo-piceous. B.M.

Male. Length 1½–2 lines.—The antennæ fulvous beneath, submoniliform; apex of the clypeus, the labrum and mandibles yellow, the tips of the latter ferruginous; the wings subhyaline, splendidly iridescent; the tarsi rufo-piceous. Abdomen elongate-ovate, the margins of the intermediate segments depressed at their base; smooth, shining, and very closely and finely punctured. B.M.

This is the smallest species of bee found in this country; it appears to be generally distributed, and is easily distinguished from all the other species. I possess a specimen infested by a *Stylops*; it may be known from *H. minutus* by its being more closely and strongly punctured: the male has a shorter and more convex abdomen, and the entire insect is of a deeper black.

Genus 5. ANDRENA.

Apis, pt., *Linn. Syst. Nat.* i. 953 (1766).
Andrena, pt., *Fabr. Syst. Ent.* p. 376 (1775).
Nomada, pt., *Fabr. Ent. Syst.* ii. 345 (1793).
Melitta, pt., *Kirby*, *Mon. Ap. Angl.* i. 140 (1802).

Head as wide as the thorax, subrotundate, in some species subtriangular, in the males frequently wider than the thorax; antennæ geniculated, the flagellum subclavate, in the males frequently elongate and filiform; the stemmata placed in a triangle

on the vertex ; the labial palpi 4-jointed, nearly as long as the labium ; the basal joint longest, each gradually decreasing in length ; the paraglossæ shorter than the labium ; the maxillary palpi 6-jointed, the second joint longest. The superior wings with one marginal and three submarginal cells ; the second submarginal cell receiving the first recurrent nervure in, or about the middle ; the posterior femora furnished with a floccus of hairs at the base, and the posterior tibiæ and basal joint of the tarsi covered with a thick scopa, or pollen-brush. Abdomen usually elongate-ovate, sometimes ovate ; that of the males usually elongate and lanceolate ; their mandibles frequently forcipate.

The bees included in the genus *Andrena* may be truly said to be the harbingers of spring, for on the first fine days of April males will be found frequenting the catkins and the early flowers of spring ; my earliest date of their capture is March 4th, 1849, when I met with *Andrena bicolor* and *Gwynana*, both sexes of each.

This genus is by far the most numerous in species of all the genera of bees found in this country ; we have about seventy known species, and when the northern parts of the country are assiduously searched, no doubt many more will be added. These bees are all burrowers in the ground, some species preferring banks of light earth, others hard trodden pathways, &c. ; their burrows differ in depth, but are seldom less than about six, whilst others excavate to nine or ten inches ; at the bottom of each burrow is formed a small oval cell, or chamber, in which the industrious female lays up a small pellet of pollen mixed with honey ; these little balls are usually about the size of a garden pea, varying somewhat in size in different species. Sometimes, apparently to economise time, the bee constructs branch tunnels, each having a similar chamber at its extremity ; this peculiarity I have observed in *A. rubricata* and *A. fulvescens* ; it is also probably not unusual with many other species : when she has completed her task, she closes the mouth of the tunnel.

These bees are subject to the attacks of parasites : the first to be remarked upon, are those bees which compose the genus *Nomada* ; they are more popularly known as wasp-bees, since they bear a considerable resemblance to some of the small solitary species of that family. These parasites appear to be upon a perfectly friendly footing with the industrious bees, and are permitted, without let or hindrance, to enter their burrows. It has been advanced as a proof of the ingenuity and artifice ne-

cessary to be employed in effecting the deposit of their eggs in the working bees' nests, that the parasites should bear a close resemblance to the bees upon which they are parasitic: some instances may undoubtedly be advanced, as *Apathus* and *Bombus*, and also in the different species of *Volucella* which infest the nests of humble-bees, but amongst the solitary bees no such resemblance is required to aid in any necessary deception. It may be remarked, that the two cases are not analogous: this is true; and I am not prepared to say that in the case of the *Bombi* and their enemies, it may not be necessary, but as regards solitary bees it certainly is not;—colonies of *Andrenidæ* and their parasites mingle together in perfect harmony, issuing from and entering into the burrows indiscriminately. I have on several occasions watched with much enjoyment a large colony of *Eucera longicornis*, the males occasionally darting forwards with great velocity, then turning sharply round, and as it were swimming in circles close to the ground, then darting off again and again in an unceasing round of sportive enjoyment; their industrious partners, whose whole existence appears to be bound up in one unceasing round of labour, would occasionally return home laden with food for their young progeny. Sometimes it would happen that a *Nomada* had previously entered her nest; when such proved to be the case, she would issue from it, and flying off to a short distance wait patiently until the parasite came forth, when she would re-enter and deposit her burden. It will be observed, in this instance, that between *Eucera* and *Nomada* no resemblance exists in general appearance, one being several times larger than the other, and covered with pubescence of a sombre colour; whereas the parasite is a gaily-coloured insect, destitute of pubescence, and readily observed from the brightness of its colouring. To some extent, I have observed that a constant connexion between certain species exists, and I have never met with some species of these parasites except in connection with certain species of *Andrena*; but there are others, as *Nomada ruficornis, succincta, alternata* and *Lathburiana*, which infest the nests of several species of *Andrena* indiscriminately; the species are, *A. tibialis, Trimmerana, Afzeliella* and *fulva*; but the following I have never observed, except connected as follows: *Nomada lateralis* and *A. longipes, N. baccata* and *A. argentata, N. borealis* and *A. Clarkella, N. Germanica* and *A. fulvescens*, and, lastly, *N. sexfasciata* and *Eucera longicornis*. Much further investigation is still necessary before we can arrive at a knowledge of the real nature of the connexion which exists between the bees and their parasites. It has been supposed that the parasitic larva is hatched sooner than that of the rightful owner of the nest, and that it consequently consumes

the food, and leaves the larva of the bee to perish; but to this I do not assent: it appears so contrary to all natural laws, that I cannot think it even probable: nature I have never observed to be thus wasteful of animal life—such a proceeding is unnecessary, and therefore unlikely: where a destruction of animal life is observed, it can usually be traced to some reasonable cause, as the destruction of the larvæ of certain Lepidoptera, being a check upon their superabundance: a parallel to this does not appear to me to exist in the case of the bees: I am more inclined to believe, that when the parasite has deposited her egg upon the store of pollen, the industrious bee at once deserts it, and proceeds to construct a fresh burrow; and that the parasites which may be observed constantly entering different burrows, do so in order that they may find the requisite quantity of food, which will usually be much less than that required for the industrious bee; having found which, they deposit their egg, and the nest is then possibly deserted by its legitimate owner.

The *Andrenidæ* are also subject to the attacks of other enemies, if so they can be called; we have seen that in the first place their food is attacked by *Nomadæ*, we are now to find their larvæ attacked by insects belonging to the Order Coleoptera; these belong to the genus *Stylops*, which several distinguished entomologists of the present day agree in placing amongst the Heteromerous parasitic beetles. These insects were placed in a new order by Mr. Kirby, named *Strepsiptera*, and as such they are still regarded by many entomologists; we have at present only to do with them as enemies to the bees, and briefly to narrate the manner in which the latter are attacked by them. These insects are diminutive in size, the largest known species not exceeding a quarter of an inch in length; we are now speaking of the winged males; the females are apterous grub-like insects, which never leave the bodies of the bees. If the abdomens of a number of *Andrenidæ* be examined, it is most probable that the female of *Stylops* will be found; her presence is known by the protrusion of her head and a portion of the thorax between the abdominal segments on their superior surface, resembling the point of a small bud of a brown colour, or rather a flattened scale. I have several times bred the larvæ of *Stylops* in the following manner: on finding a bee infested as described, place her in a box 5 or 6 inches square, cover it with gauze, and supply the bee with fresh flowers such as the *Andrenidæ* frequent; examine the bee every day, and it is most likely that in eight or ten days she will appear as if her abdomen was covered with dust; examine it, and in all probability she will be found to be covered with an innumerable quantity of exceedingly minute animals;

these are the larvæ of *Stylops*; by the aid of a magnifying-glass they may be seen to issue from the transverse aperture on the thorax: when the bee re-enters the cell, or settles upon flowers, these diminutive creatures will of course occasionally be deposited, and by these means, when other bees visit the flowers, they attach themselves to them and are carried to their nests. Judging from the multitude of larvæ produced by each female *Stylops*, amounting to many hundreds in each case, and the rarity of the perfect insect, the majority must perish, probably in their larval condition. From the fact of seldom more than two *Stylops* being found to infest the same bee, we may suppose that to be the largest number which infests one larva of an *Andrena*; they undergo their changes in the body of the bee, the male on its final transformation becoming an active winged insect, the female remaining a mere apod, attached for life to the bee which nourished it. A most complete and interesting summary of the observations of entomologists on these parasites, will be found in the twentieth volume of the 'Transactions of the Linnæan Society,' by Mr. George Newport, who has in this paper entered most minutely into the anatomy, functions and development of these remarkable parasites, being the most interesting and complete essay on the subject yet written.

There are still other parasites to be noticed, which will occasionally be found on the bodies of these bees; the first to be noticed is a small orange-coloured *Pediculus*, which is about one-tenth of an inch in length; this is the larva of *Meloë*; I have several times reared these hexapods from the eggs of that beetle. For the most complete account of their history, reference must be made to the twentieth volume of the 'Linnæan Transactions,' which contains Mr. George Newport's most interesting memoir on *Meloë cicatricosus*; in this paper it is shown that the larva of the beetle feeds on that of *Anthophora pilipes*; but it remains to be proved, that the larva of an *Andrena* can serve as food for the larva of a *Meloë*; I am inclined to think this can never be the case, and that the fact of our finding them on these bees is a mere indication of the usual habit of the larvæ in attaching themselves to any insect which comes in their way, for we as constantly find them on Diptera and flower-visiting Coleoptera as upon the *Andrenidæ*: it has been shown that a larva of *Anthophora* will nourish that of *Meloë*, but so small a larva as that of *Andrena* can I think scarcely answer that purpose; I have however included them, but merely as supposed parasites on *Andrena*.

We now come to the last supposed parasite on these bees; it is found on their bodies, and exactly resembles in form the last-mentioned, but is of a brown-black colour, and is full twice

the size; they attach themselves to the hairy parts of the bees, as the metathorax, and the sides of the thorax beneath the wings. What these pediculi really are, is at present involved in complete obscurity; Mr. Kirby regarded them as insects in their perfect condition, naming them *Pediculus Melittæ*. I have frequently observed these creatures in considerable numbers in the flowers of *Ranunculus acris*, as many as twenty or more in a single flower, about the month of April; and I think always before the usual time for meeting with the larvæ of *Meloë*. I have found them on various species of bees, usually on those which are most pubescent, as *Andrena fulva, thoracica,* and *nigro-ænea*; also commonly on *Melecta armata, Anthophora retusa* and *pilipes*; this circumstance would appear to confirm, or indicate a connection between the insects, and from analogy we might readily conclude that this *Pediculus* must be a parasite on some species of bee; but we have nothing in support of this supposition, and against it we have the following observations:—Mr. Newport has shown that it cannot be the larva of *Meloë cicatricosus,* and, as well as myself, has proved that it cannot be that of *M. violaceus* or of *M. Proscarabæus*; and since the only other species of *Meloë*, the *M. variegatus*, does not occur near London, it appears certain that it cannot be the larva of any species of that genus, unless it be discovered hereafter that the larva of *Meloë* not only increases in size in its hexapod state, but that it also changes from bright orange to black.

Another circumstance which induces me to hesitate in adopting an opinion of the *Pediculus* being a larva at all, is the fact, that on opening some cells of *Anthophora retusa,* which I dug up on Hampstead Heath, I found two living specimens of the hexapod in the same cell as the perfect bee; it is certainly possible that they might have subsisted on a portion of the food laid up by *Anthophora*; but here was no change of condition, and how came they into the cell? I am inclined to think that they, being insects in their perfect condition, came there exactly in the same way as we find *Forficulæ*, having forced an entrance, which I did not observe, and that they were in quest of food, seeking what they might devour.

In the determination of the species of the genus *Andrena* much difficulty will be met with, the similarity of the males of many species being so great, that nothing short of a long and attentive study of them, combined with out-of-door observations, will enable the student to discover those niceties of distinction which are easily detected by the practised observer; these difficulties are considerably enhanced by the changes in colour to which they are subject. The species of the first division which are usually more or less red are very inconstant; speci-

mens of the same species from one locality being highly coloured, whilst those from another have all a tendency to a sombre colouring; those species which have fulvous, or yellow pubescence, are much changed by exposure to light, so much so, that a bright fulvous insect becomes quite grey, or cinereous; it must therefore be borne in mind, that the individuals described are only such as are in fine condition.

The genus *Andrena* contains several species which, in the neuration of the wings, differ somewhat from that of the type; these will be found to agree with the second type of neuration, in which the first recurrent nervure is received by the second submarginal cell, towards the second transverse cubital nervure; that is to say, beyond the middle. The following species belong to it:—*A. pilipes, varians, helvola, fucata, Clarkella, fulva, Lapponica, Smithella, denticulata,* and *argentata.*

DIV. I.—*The abdomen in one or both sexes usually more or less red.*

1. Andrena Hattorfiana.

A. atra, glabriuscula; abdomine nigro, cingulo antico rufo; ano scopaque fulvis.

Nomada Hattorfiana, *Fabr. Ent. Syst.* ii. 349. 14 ♀.
Andrena equestris, *Panz. Faun. Germ.* 46. 17.
Andrena Hattorfiana, *Fabr. Syst. Piez.* p. 325. 14.
Spin. Ins. Lig. fasc. i. p. 121. 7.
St. Farg. Hym. ii. 254. 25 ♂ ♀.
Nyland. Ap. Boreal. p. 208. 1.
Melitta Lathamana, *Kirby, Mon. Ap. Angl.* ii. 83. 38 ♀.
Melitta hæmorrhoidalis, *Kirby, Mon. Ap. Angl.* ii. 141. 81, var. ♀.
Andrena 4-punctata, *Fabr. Syst. Piez.* p. 324. 11 ♂.
Andrena hæmorrhoidalis, *Smith, Zool.* v. 1664. 1.

Female. Length 6–8 lines.—Black; the face thinly clothed with a short griseous pubescence, and having a fine yellowish pile close to the inner margin of the eyes; the flagellum rufo-piceous beneath. Thorax shining, finely punctured; the sides and the metathorax have a long, loose, sparing pubescence; the wings fulvo-hyaline, their apical margins have a fuscous cloud; the tegulæ and nervures ferruginous; the legs have a pale fulvous pubescence, the floccus being the palest; the scopa fulvous, the calcaria pale testaceous, the tarsi ferruginous. Abdomen ovate, subdepressed; the first, second, and apical margin of the third segment, ferruginous; sometimes the basal

margin also of the latter is red; the extreme base is black, and the second segment has usually a black dot at its extreme lateral margin in the middle; the apical margins of the third and fourth segments have narrow fasciæ of white pubescence, the first usually interrupted; the apical fimbria fulvous. B.M.

Var. *a*. The apical margin of the first and base only of the second segment red.

Var. *β*. The abdomen black, the margins of the segments being obscurely rufo-testaceous.

Male. Length 6–7 lines.—Black; the clypeus white, and having four black dots, two about the middle and two united to the black anterior margin. Thorax more pubescent than in the female; the wings as in the other sex; the pubescence on the legs griseous. Abdomen oblong-ovate, the margins of the segments subdepressed and obscurely rufo-piceous; the apex pale fulvous. B.M.

Var. *a*. The basal segment rufo-testaceous.

This is the largest and handsomest species of the genus found in this country; the variety *a*. of the male has not yet been captured in England, but it is not uncommon on the continent. The highly coloured specimens appear to be the normal condition of the species, which is very widely distributed over Europe, being found in France, Italy, Germany, Switzerland, Albania, Denmark, Sweden and Finland; in most of these localities the coloured specimens prevail, whilst in England they are rare. This insect occurs at Erith, Darenth and Birchwood, Kent; it is a summer species, being found during July and August; some very fine specimens were captured by Mr. Samuel Stevens in Devonshire.

2. Andrena Rosæ.

A. atra, cinereo-subvillosa; abdomine cingulo antico rufo; scopa versicolori.

Andrena Rosæ, *Panz. Faun. Germ.* 74. 10 ♀.
Spin. Ins. Lig. fasc. iii. p. 192. 19.
Smith, Zool. v. 1665. 2.
Andrena Austriaca, *Panz. Faun. Germ.* 53. 19.
Melitta Rosæ, *Kirby, Mon. Ap. Angl.* ii. 83. 39 ♀, var. *β*.
Melitta zonalis, *Kirby, Mon. Ap. Angl.* ii. 87. 40 ♂.

Female. Length 5–6 lines.—Black; the flagellum piceous beneath, the tips of the mandibles ferruginous; the sides of the face, the margin of the vertex, and the cheeks have a pale fulvous pubescence. Thorax: the disk shining and finely punc-

tured, interspersed with a few larger punctures; the sides, and the metathorax have a pale fulvous pubescence, the legs have a similar pubescence; the apical joints of the tarsi ferruginous; the wings fulvo-hyaline, the tegulæ rufo-piceous, the nervures ferruginous; the floccus pale fulvous, the scopa of the same colour beneath, above fuscous. Abdomen oblong-ovate, subdepressed; the second segment and apical margin of the first red; the second segment has sometimes a square black spot in the middle; the apical fimbria fusco-ferruginous; beneath, the second segment is red, and the margins of the segments have a pale fulvous fringe. B.M.

Var. *α*. The apical margin of the first and basal margin of the second segments red; the legs dark rufo-piceous.

Var. *β*. A minute red dot on each side of the basal segment and its apical margin red.

Var. *γ*. The apical margins of the three basal segments rufo-testaceous.

Male. Length 4 lines.—Black; the antennæ as long as the thorax, the joints of the flagellum subarcuate; the face clothed with a fuscous pubescence. Thorax shining, punctured as in the female; the pubescence and wings also as in that sex; the legs dark rufo-piceous, the claws ferruginous. Abdomen lanceolate, and having a thinly scattered pale fulvous pubescence; the apical margins of the three basal segments more or less red, or rufo-piceous; beneath, the second segment is usually red. B.M.

This is a very variable species in the colouring of the abdomen; Mr. Kirby describes five varieties, but the var. *δ*. and *ε*. are individuals of *A. florea*. *A. Rosæ* is a very local insect; in 1836 a single female occurred, between which year and 1844 no one appears to have met with it; but in August of the latter year fifteen specimens were taken, three of which were males; the locality was Shirley, near Croydon; specimens have also been captured at Hastings.

3. Andrena eximia.

A. atra, cinereo-subvillosa; abdominis segmentis tribus basalibus rufis.

Andrena eximia, *Smith, Zool.* v. 1930. 70 ♂.
Andrena Rosæ, *Smith, Zool.* v. 1665. 2 ♀ (not var. 2, 3, 4).

Andrena spinigera, *Smith*, *Zool.* v. 1670. 7 ♂, var. 3 (not of *Kirby*).
Andrena eximia, *Smith*, *Zool.* vi. 2211 ♀.

Female. Length 5½ lines.—Black; the face and cheeks have a pale fulvous pubescence; the flagellum fulvo-testaceous beneath, the mandibles ferruginous at the tips; thorax very finely punctured; the sides and metathorax clothed with pale fulvous pubescence; wings subhyaline, nervures rufo-testaceous; the legs have a fuscous pubescence above, beneath it is pale fulvous, that on the tarsi beneath ferruginous, the apical joints of the tarsi ferruginous. Abdomen ovate, the three basal segments red; the base of the abdomen, the apical margin of the third segment, and a quadrate spot in the middle black, the three apical segments black, the apical fimbria fusco-ferruginous. B.M.

Male. Length 5–5½ lines.—Black; the face densely clothed with sooty-black pubescence, the mandibles forcipate, ferruginous at their apex, and armed at their base with an acute spine; the antennæ nearly as long as the thorax, the joints subarcuate. The thorax thinly clothed with fulvo-ochraceous pubescence; the wings hyaline, the nervures rufo-testaceous, the apical margins slightly clouded; the legs fusco-ferruginous, the posterior tibiæ and the tarsi ferruginous; their pubescence obscure fulvous. Abdomen lanceolate, coloured as in the other sex. B.M.

In the year 1836 a single specimen of the female of this species was captured at Darenth Wood in the beginning of May, and for some years was regarded as a variety of *A. Rosæ*; but subsequently, numbers were met with in the autumn of 1846. In 1846 Mr. Weir took both sexes in company on the 10th of April; on a re-examination of the specimen first captured, it proved to be distinct from, although very like, *A. Rosæ*.

It is quite possible that it may be synonymous with the *A. spinigera* of Kirby; but the latter insect has occurred near Hampstead, and never with any appearance of the red belt on the abdomen; they are therefore kept apart. This species has occurred at Darenth Wood in May, at Bexley, captured by Mr. S. Stevens; and at Pembury, captured by Mr. Weir; Mr. Heales also met with some males in the month of April, at Hastings.

4. Andrena florea.

A. atra, fulvo-cinereo-pubescens; abdominis segmentorum marginibus rufo cingulatis.

Andrena florea, *Fabr. Ent. Syst.* ii. 308. 6; *Syst. Piez.* p. 324. 12 ♀.
St. Farg. Hym. ii. 259. 32.
Nyland. Revis. Ap. Boreal. 251. 3.
Melitta Rosæ, *Kirby, Mon. Ap. Angl.* ii. 85, var. δ & ε, and the male described.
Andrena rubricata, *Smith, Zool.* v. 1666. 3 ♂ ♀.

Female. Length 6½ lines.—Black; the face clothed with yellowish brown pubescence; the flagellum rufo-piceous beneath; the pubescence on the thorax pale fulvous, fuscous on the disk; wings subhyaline, their margins faintly clouded, the nervures pale ferruginous; the legs have a fuscous pubescence above, beneath it is pale fulvous; that on the basal joint of the tarsi beneath is dark fuscous, the claws ferruginous. Abdomen ovate and shining, delicately punctured, the apical margins of the segments rufo-piceous; the first and second are usually of the brightest colour; the apical fimbria fuscous. B.M.

Male. Length 5–5½ lines.—Black; head wider than the thorax, the pubescence fulvo-cinereous; the tegulæ rufo-piceous, the wings fulvo-hyaline, the nervures pale ferruginous; the legs dark rufo-testaceous, their pubescence pale fulvous, the claws ferruginous. Abdomen ovate-lanceolate; the second segment, the apical margin of the first and basal margin of the third segments red; the apical margins of the following segments obscurely rufo-testaceous; the apex fulvous.

Var. *α.* A fuscous band across the middle of the second segment.

Var. *β.* The margins only of the first and second segments narrowly red.

Fabricius's name for this species is adopted without doubt, Dr. Nylander having seen the typical insect in the Museum at Kiel, and his acute and accurate judgment may be fully relied upon. This is truly a summer insect, appearing usually about the first of June; it is associated with the brightest of all the sunny days of June, when the wild briony is creeping over the hedge, the flowers of which are its chief delight; it is common in many of the beautiful lanes of Hampshire, near Hawley; it burrows in the sandy banks, or sometimes in the trodden pathways. This beautiful species used to occur at Highgate, but

has not been observed there for some years past; it occurs at Weybridge; in Hampshire it is extremely abundant. The male may be known at once from the same sex of *A. Rosæ*, by having the joints of the flagellum simple, not arcuate.

5. Andrena decorata.

A. atra, abdomine nigro, segmento primo secundoque marginibus rufis; scopa fulva.

Andrena decorata, *Smith, Zool.* v. 1667. 4.

Female. Length 6–6½ lines.—Black; the flagellum rufo-piceous beneath; the face clothed with pale fulvous pubescence. Thorax coarsely punctured, the sides of the metathorax have a dense pale fulvous pubescence; the tegulæ rufo-piceous, the nervures pale testaceous; the legs rufo-testaceous, and having a fulvous pubescence, the scopa fulvous. Abdomen: the second segment and the apical margin of the first red, the former having a transverse fuscous stain in the middle, the apical fimbria fuscous. B.M.

Male. Length 5–5½ lines.—Black; the head rather wider than the thorax; the face and sides of the metathorax have a fulvo-ochraceous pubescence; the antennæ shorter than the thorax, the joints subarcuate; the wings hyaline, the nervures pale ferruginous, the apical margins faintly clouded; the tarsi and apex of the tibiæ pale rufo-testaceous. Abdomen lanceolate, the apical margins of the three basal segments red.

This species closely resembles *A. Rosæ* in general appearance, but may be easily distinguished from it, having the thorax coarsely punctured, and the scopæ fulvous: it is very local, and has been only twice met with, once at Birch Wood, and again at Shirley Common.

6. Andrena Cetii.

A. nigra, cinereo-subvillosa; thorace rufescenti; abdomine cingulo rufo, segmentis posticis flavo-ciliatis.

Apis Cetii, *Schrank, Ins. Aust.* p. 405. 818 ♀.
Andrena marginata, *Fabr. Sp. Ins.* i. 473. 4; *Mant. Ins.* i. 298. 5; *Ent. Syst.* ii. 309. 10; *Syst. Piez.* p. 326. 20.
Panz. Faun. Germ. 72. 15.

Andrena marginata, *St. Farg. Hym.* ii. 255. 26.
Nyland. Ap. Boreal. p. 209. 2; *Revis. Ap. Boreal.* p. 251. 4.
Melitta Schrankella, *Kirby, Mon. Ap. Angl.* ii. 90. 42.
Melitta affinis, *Kirby, Mon. Ap. Angl.* ii. 92. 43 (var. ϵ).
Andrena Cetii, *Smith, Zool.* v. 1668. 6 ♂ ♀.

Female. Length 5 lines.—Black; the face has a thin cinereous pubescence, and a line of silvery pile along the inner margins of the eyes; the flagellum rufo-piceous towards the apex beneath. Thorax thinly clothed with pale ochraceous pubescence; the wings subhyaline, slightly clouded at their apex, the nervures ferruginous; the legs have a short cinereous pubescence, their floccus and scopa beneath are of the same colour, the latter fuscous above. Abdomen oblong-ovate, the basal segment black, except its apical margin, which, as well as the rest of the abdomen, is red. B.M.

Var. α. The two apical segments fuscous.
Var. β. The three apical segments fuscous.
Var. γ. The three apical segments and a dot on the third fuscous.
Var. δ. The three apical segments and a dot on the second and third fuscous.
Var. ϵ. Only the margins of three basal segments obscurely red.

Male. Length 4 lines.—Fuscous; the face and disk of the thorax have an ochraceous pubescence, the clypeus white and having two black dots; the wings as in the female; the legs rufo-testaceous, their pubescense pale ochraceous. Abdomen lanceolate, the apical margins of the segments obscurely rufo-piceous.

The female of this elegant insect is subject to great variety of colouring, some of these differences are indicated; the last is, on a comparison of specimens, undoubtedly the *Melitta affinis* of Kirby; the pubescence is frequently hoary or white; the species does not appear before July, and is soon bleached by exposure. Entomologists may meet with this beautiful insect in Hampshire, but it is very local; Mr. S. Stevens has several times captured it in Sussex in the month of August; Mr. Sprague reports that it is not at all uncommon in the meadows at Cambridge; probably *A. frontalis* is the male in a worn condition.

7. Andrena cingulata.

A. nigra, cinereo-subpubescens; abdomine glabriusculo, cingulo ferrugineo utrinque puncto nigro.

Nomada cingulata, *Fabr. Sp. Ins.* i. p. 488. 8 ♀; *Mant. Ins.* i. 307. 10; *Ent. Syst.* ii. 349. 15; *Syst. Piez.* p. 394. 17. *Rossi, Mant.* p. 326.
Apis albilabris, *Panz. Faun. Germ.* 56. 23 ♂.
Apis sphegoides, *Panz. Faun. Germ.* 56. 24 ♀.
Andrena sphegoides, *Spin. Ins. Lig.* fasc. i. p. 121. 6.
Melitta cingulata, *Kirby, Mon. Ap. Angl.* ii. 88. 41.
Andrena cingulata, *St. Farg. Hym.* ii. 257. 29. *Nyland. Ap. Boreal.* p. 210. 3; *Revis. Ap. Boreal.* p. 251. 5. *Smith, Zool.* v. 1668. 5.

Female. Length 4½ lines.—Black and shining, the pubescence cinereous; a line of white pile on each side of the face along the inner margin of the eyes; the flagellum rufo-piceous beneath. Thorax: the tegulæ rufo-piceous, the wings subhyaline, faintly clouded at their apical margins, the nervures nigro-piceous; the floccus and scopa beneath white, the latter fulvous above. Abdomen ovate, delicately punctured, the second and third segments and the apical margin of the first red; the second has on each side a minute fuscous dot, the apical fimbria fulvous. B.M.

Male.—This sex only differs from the female in having the clypeus white, with two black dots, and the abdomen more convex above. B.M.

This pretty little species is not uncommon, but rather local; during June and July it has occurred for many years at the side of Bishop's Wood, Hampstead, frequenting the flowers of the Germander Speedwell.

8. Andrena ferox.

A. nigra, pallide fulvo-villosa; abdomine nitido; tibiis plantisque posticis fulvis.

Andrena ferox, *Smith, Zool.* v. 1670. 8 ♂.
Andrena distincta, *Smith, Zool.* v. 1744. 30 ♀ (nec *Lucas, Explo. Sc. Algér.*).

Female. Length 6 lines.—Black: the face thinly clothed with fulvous pubescence, the antennæ nearly as long as the thorax: the clypeus coarsely punctured, and having in the centre a longitudinal shining space. Thorax: the sides have a dense pale

fulvous pubescence, the disk nearly naked, having merely a few scattered hairs; the tegulæ rufo-piceous, wings fulvo-hyaline, faintly clouded at their extreme apical margins, the nervures pale ferruginous; the legs dark rufo-piceous, the posterior tibiæ and all the tarsi pale ferruginous and clothed with fulvous pubescence, the floccus pale fulvous. Abdomen ovate, the apical margins of the segments obscurely rufo-piceous; the apical fimbria fusco-ferruginous. B.M.

Male. Length 4–4½ lines.—Black; head subquadrate, much larger than the thorax, sometimes more than twice the size; the mandibles forcipate and armed at their base with an acute spine; the antennæ as long as the thorax; the wings subhyaline, and faintly clouded at their apical margins, the nervures pale rufo-testaceous; the thorax has a little pale fulvous pubescence at the sides; the posterior tibiæ, the anterior and intermediate pairs at their apex, and the tarsi pale rufo-testaceous. Abdomen lanceolate, the apical margin of the first, the basal and apical margins of the second, and the basal margin of the third segments, broadly rufo-testaceous; the extreme apex has a fulvous pubescence. B.M.

Var. *a*. The abdomen only having the apical margin of the first and the basal and apical of the second segments rufo-testaceous.

The first specimens of this fine species were taken by Mr. Desvignes at Windsor, who met with examples of both sexes, but at that time was not aware that they belonged to the same species; since that time Mr. Walcott has discovered a new locality for it near Bristol, capturing both sexes and establishing their identity; the British Museum is indebted to that gentleman for a series of fine varieties.

Div. II.—*The thorax densely pubescent, the abdomen naked, smooth and shining; without fasciæ of pale pubescence.*

9. Andrena cineraria.

A. atra, albido-pubescens; thorace hirsuto fascia atra; abdomine atro-cærulescenti nitido.

Apis cineraria, *Linn. Faun. Suec.* p. 420. 1688; *Syst. Nat.* i. 953. 5, & *Cab. Mus. Linn. Soc.*
Fabr. Ent. Syst. ii. 329. 67.
Apis atra, *Christ. Hym.* p. 174. t. 14. f. 1.
Panz. Faun. Germ. 56. 14.
Apis cinerea, *Fourc. Ent. Par.* ii. 144. 8.
Melitta cineraria, *Kirby, Mon. Ap. Angl.* ii. 98. 47.

Andrena cineraria, *Latr. Hist. Nat.* xiii. 362. 1.
Fabr. Syst. Piez. 323. 5.
Spin. Ins. Lig. fasc. i. p. 117. 51.
St. Farg. Hym. ii. 238. 6.
Nyland. Ap. Boreal. p. 211. 6.
Smith, Zool. v. 1735. 14.
Lucas, Explo. Sc. Algér. iii. 169. 58.

Female. Length 5–7 lines.— Black; the face clothed with white pubescence; that on the thorax is white, having a black band between the wings; the wings subhyaline, their apical margins having a dark fuscous cloud; the pubescence of the legs black, except the fringe on the anterior femora, which is white; abdomen blue-black, smooth and shining; the apical fimbria fuscous. B.M.

Male. Length 5–6 lines.—Black; the head and thorax clothed with white pubescence; the wings hyaline, their apical margins faintly clouded; the femora fringed with white pubescence. Abdomen blue-black, lanceolate, and having the two basal segments clothed with white pubescence, most densely so at the sides. B.M.

This elegant insect is found in all parts of the United Kingdom; it is an early species, usually appearing in April, but I once met with the male in 1842 on the 22nd of March in the Battersea Fields: it is fond of burrowing in trodden pathways, and is very abundant in the walks in Hyde Park. In Yorkshire it is not uncommon in the month of July.

10. Andrena pilipes.

A. aterrima glabra; abdomine nitido; tibiarum posticarum scopa subtus alba, supra fusca.

Andrena pilipes, *Fabr. Spec. Ins.* i. 474. 12 ♀; *Mant. Ins.* i. 298. 13; *Ent. Syst.* ii. 312. 21; *Syst. Piez.* 322. 2.
Rossi, Faun. Etrus. ii. 98. 898.
Spin. Ins. Lig. fasc. iii. p. 191. 17.
St. Farg. Hym. ii. 236. 3.
Nyland. Ap. Boreal. p. 210. 4.
Apis atra, *Schrank, Ins. Aust.* p. 403. 814?
Apis carbonaria, *Christ. Hym.* p. 201. t. 17. f. 13.
Andrena aterrima, *Panz. Faun. Germ.* 64. 19.
Latr. Hist. Nat. xiii. 363. 3.
Melitta pilipes, *Kirby, Mon. Ap. Angl.* ii. 96. 46 ♀.
Melitta pratensis, *Kirby, Mon. Ap. Angl.* ii. 100. 48 ♂.
Andrena pratensis, *Nyland. Ap. Boreal.* p. 211. 5 ♂ ♀.
Andrena nitida, *Lucas, Explo. Sc. Algér.* iii. 181. 86 ♂?
Andrena atra, *Smith, Zool.* v. 1734. 13.

Female. Length 6–7½ lines.—Black; the pubescence on the head and thorax black; the flagellum nigro-piceous beneath; the wings subfuscous and having a dark cloud at their apical margins, the nervures ferruginous; the floccus on the posterior trochanters of a dirty-white, the scopa silvery-white beneath, above fuscous. Abdomen ovate and shining, its apical fimbria sooty-black. B.M.

Male. Length 5–6 lines.—Very closely resembles the other sex, the pubescence on the thorax inclining to griseous; the abdomen ovate-lanceolate, shining, and having a little sooty pubescence at the apex; legs black; the claws ferruginous. B.M.

This very distinct species may be called the Kentish bee, from the fact of our never having found it in any other county; it is very abundant in many parts of Kent: I have frequently met with colonies constructing their burrows in perpendicular banks of hard sand. This bee is very partial to thistle-heads, from which it obtains a white pollen, and when loaded with this it has a very strange appearance.

Both sexes vary considerably in the intensity of the colouring of the wings. Mr. Kirby's *M. pratensis* is a dark winged male, as will be seen on examining the authentic specimen in the Cabinet at the Entomological Society.

11. Andrena thoracica.

A. atra, villosa; thorace supra hirsuto-rufo.

Apis thoracica, *Fabr. Syst. Ent.* p. 383. 31 ♀; *Spec. Ins.* i. 481. 40; *Mant. Ins.* i. 302. 45; *Ent. Syst.* ii. 328. 63.
Christ. Hym. p. 178. t. 14. f. 6 ♂.
Apis bicolor, *Christ. Hym.* p. 178. t. 14. f. 6 ♀.
Andrena bicolor, *Rossi, Faun. Etrus.* ii. 97. 896.
Panz. Faun. Germ. 65. 19 ♂.
Melitta thoracica, *Kirby, Mon. Ap. Angl.* ii. 101. 49 ♀.
Melitta melanocephala, *Kirby, Mon. Ap. Angl.* ii. 103. 50, var. ♂.
Andrena thoracica, *Fabr. Syst. Piez.* p. 322. 3.
Spin. Ins. Lig. fasc. i. 120. 5.
St. Farg. Hym. ii. 239. 7.
Smith, Zool. v. 1735. 15.

Female. Length 6–7½ lines.—Black; the disk of the thorax clothed with rufo-fulvous pubescence; wings fusco-hyaline, their apical margins having a dark fuscous cloud; the legs have a black pubescence, the claws ferruginous. Abdomen

ovate, shining and delicately punctured, the apical fimbria fuscous. B.M.

Male. Length 5½–6 lines.—Black; altogether closely resembling the other sex; abdomen elongate ovate. B.M.

This bee usually appears about the end of May; it is an abundant insect in may parts of Kent, and is seldom found out of that county. It occurs at Hawley in Hampshire: burrows, like *A. pilipes*, frequents thistle heads, and appears to prefer hard sand banks in which to form its nidus.

In different individuals the wings will be found to vary considerably in the depth of colouring; Kirby's *M. melanocephala* is only a large specimen of the male, in fine fresh condition.

12. Andrena nitida.

A. nigra nitidiuscula; thorace hirtissimo rufo-fulvo; scopis supra fuscis, subtus griseo-albis, abdomine apice fusco-fimbriato.

Apis nitida, *Fourc. Ent. Par.* ii. 104. 51.
Melitta nitida, *Kirby, Mon. Ap. Angl.* ii. 104. 51.
Andrena nitida, *Spin. Ins. Lig.* fasc. i. p. 122. 8.
St. Farg. Hym. ii. 237. 5.
Smith, Zool. v. 1736. 16.
Nyland. Revis. Ap. Boreal. p. 253. 10 (nec *Fabr. Panz.*).
Andrena consimilis, *Smith, Zool.* v. 1736. 17 (var. ♀).

Female. Length 5½–6½ lines.—Black; the pubescence on the clypeus griseous, that on the face and vertex fuscous; the thorax clothed above with fulvous pubescence; beneath, as well as the fringe on the femora and floccus on the posterior trochanters, white; the scopa silvery-white beneath, dark fuscous above; all the legs have a similar fuscous pubescence above; the wings subhyaline, their apical margins having a fuscous cloud, the nervures ferruginous. Abdomen ovate, shining and very delicately punctured, the second and third segments have on each side on their basal margins a patch of white pubescence; sometimes the fourth has a similar spot; the apical fimbria fuscous; beneath, the margins of the segments fringed with white pubescence. B.M.

Var. *a.* The legs nigro-piceous; the posterior tibiæ and all the tarsi ferruginous, the scopa pale fulvous, the apical fimbria of the abdomen fulvous.

Male. Length 5–6 lines.—Very closely resembling the female, the pubescence on the face whiter, and the apical joints of flagellum slightly testaceous; thorax as in the female; abdo-

men more elongate, and having a griseous pubescence on each side towards the base, and a little rufo-fuscous pubescence at the apex. B.M.

This very marked species appears to be generally distributed; it is one of the early spring bees. The females prefer the flowers of the common Dandelion, in which they cover themselves with pollen. Var. *a.* was formerly considered to be a separate species, but observation has proved that it is only an extreme variety.

13. Andrena vitrea.

A. atra, subvillosa; thorace pallido-villoso; scopa fulva.

Andrena vitrea, *Smith, Zool.* v. 1737. 18 ♀.

Female. Length 6½ lines.—Black; the pubescence on the face fuscous, intermixed with a few fulvous hairs; the thorax thinly clothed above with fulvous pubescence, beneath and on the femora it is paler; the wings fulvo-hyaline, the nervures pale ferruginous; the scopa fulvous, the floccus pale fulvous; the legs otherwise have a fuscous pubescence above, that on the tarsi beneath dark ferruginous, the claws ferruginous. Abdomen ovate, smooth and shining, the apical fimbria black; beneath, the second segment has a rufous spot, sometimes the entire sides are rufous.

Of this very distinct species there is a fine series in Mr. Desvignes' collection; their precise locality is not known, but probably they came from the neighbourhood of Windsor.

14. Andrena albicans.

A. nigra, albicanti-subvillosa; thorace anoque ferrugineis; tibiis posticis fulvis.

Melitta albicans, *Kirby, Mon. Ap. Angl.* ii. 94. 45 ♂ ♀.
Andrena albicans, *St. Farg. Hym.* ii. 242. 10.
Smith, Zool. v. 1734. 12.
Nyland. Ap. Boreal. p. 215. 11.

Female. Length 5 lines.—Black; the face clothed with griseous pubescence, thinly on the clypeus, which is coarsely punctured and has a longitudinal smooth line down the centre. Thorax clothed above with ferruginous pubescence, on the sides and beneath it is pallid; the wings hyaline, their apical margins slightly clouded; the posterior tibiæ and tarsi fulvous;

the claws ferruginous; the floccus pale, the scopa pale fulvous. Abdomen ovate, shining and finely punctured, at the sides is a little scattered griseous pubescence; the apical fimbria fulvous. B.M.

Male. Length 4–4½ lines.—Resembling the other sex, differing in having a pale fulvous pubescence on the face; the tegulæ rufo-piceous; the posterior tibiæ and tarsi rufo-testaceous, the former having a dark stain about the middle beneath; the intermediate tarsi and the apical joints of the anterior pair, rufo-testaceous; the abdomen covered with a short, pale, downy pile, its apex fulvous. B.M.

This is the most abundant and universally distributed species of the genus; it is not only found in all parts of the United Kingdom, but throughout Europe; examples having been received from France, Germany, Italy, Denmark, Sweden, Lapland and Siberia. Sir John Richardson brought specimens from the Arctic regions, south of Lake Winnepeg. Thus the geographical range of one of our most abundant species invests it with an interest which many of its more rare congeners do not possess. It is also one of the earliest bees which enliven the first sunny days of spring.

15. Andrena similis.

A. nigra, cinerascenti-villosa; facie antice albo-barbata; tibiis posticis apice tarsisque testaceis.

Andrena similis, *Smith. Zool.* vii. *Append.* lx.

Male. Length 4 lines.—Black; the face and cheeks clothed with long white pubescence, that on the thorax above fulvo-ochraceous; the femora fringed with long white pubescence; the tegulæ rufo-piceous, wings hyaline, iridescent and faintly clouded at their apical margins, the nervures pale ferruginous; the posterior tibiæ and the tarsi rufo-piceous, the former having a black stain beneath, nearly extending to their apex; the claws ferruginous. Abdomen ovate, shining, delicately punctured, and having a thinly scattered short griseous pubescence, the apex fulvous; beneath, the margins of the segments have a narrow white fringe. B.M.

This male closely resembles that of *A. albicans*, but in the finest condition the face is clothed with white, in *A. albicans* it is pale fulvous; the pubescence generally is more inclining to cinereous, the abdomen much more finely punctured, and the

second submarginal cell is less narrowed towards the marginal than in *A. albicans*. Some of these differences may appear slight, but it is slight differences alone which distinguish the males of many very distinct species of this genus. The Museum is indebted to Mr. Walcott for specimens of this species captured near Bristol.

Div. III.—*The thorax and abdomen densely covered with pubescence.*

16. Andrena fulva.

A. atra; thorace abdomineque supra hirsutis, fulvo-aureis, subtus nigris.

Apis fulva, *Schrank, Ins. Aust.* p. 400. 805 ♀.
Apis vestita, *Fabr. Ent. Syst.* ii. 329. 65.
Panz. Faun. Germ. 55. 9.
Apis vulpina, *Christ. Hym.* p. 161. t. 12. f. 13.
Melitta fulva, *Kirby, Mon. Ap. Angl.* ii. 128. 68 ♀.
Melitta armata, *Kirby, Mon. Ap. Angl.* ii. 121. 64 ♂.
Andrena vestita, *Latr. Hist. Nat.* xiii. 362. 2 ♀.
Fabr. Syst. Piez. p. 323. 4.
Coqueb. Illus. Sc. Ins. p. 25. t. 6. f. 7.
Spin. Ins. Lig. fasc. ii. 191. 4.
Andrena fulva, *St. Farg. Hym.* ii. 245. 14 ♀.
Smith, Zool. v. 1746. 35 ♂ ♀.
Nyland. Ap. Boreal. 214. 10 ♀; *Revis. Ap. Boreal.* 252. 8 ♂ ♀.
Lucas, Explo. Sc. Algér. iii. 180. 81.

Female. Length 5½-6½ lines.—The pubescence of the thorax above fulvo-ferruginous, that of the abdomen above bright fulvous; the pubescence on the body beneath, legs, and head, black; the wings hyaline, their apical margins faintly clouded, the nervures ferruginous. B.M.

Male. Length 4–5½ lines.—Black; the head as wide, sometimes much wider than the thorax; the clypeus has some long silvery white pubescence, above which it is slightly fulvous; the mandibles elongate, arcuate, and armed at their base with a short acute tooth. Thorax: above clothed with fulvo-ferruginous pubescence; the legs have a fulvous pubescence; the posterior tarsi, and apical joints of the anterior and intermediate pairs, ferruginous; wings as in the other sex. The abdomen ovate lanceolate, the two basal segments thinly clothed with long fulvous pubescence, the apical margins of the following segments have a long fringe of the same colour. B.M.

The female of this species is the most beautiful in the genus, and is a most abundant insect; usually appearing with the apple blossoms, to which it delights to resort; it is particularly abundant on Hampstead Heath, where in 1840 I captured several pairs *in coitu*; since which time I have on more than one occasion detected them in company. The male is so unlike the female, that nothing short of such an observation, except finding them in their burrows, could lead any one to suppose that they belonged to the same species. The best time for making such observations appears to be between nine and eleven on fine quiet sunny mornings. The beautiful colouring of "*fulva*" soon fades by exposure to the sun; it is therefore necessary to watch for their first appearance: the female fades to a pale yellow, and is subject to have the pubescence rubbed off; whilst the male becomes entirely of a hoary grey. No examples of this species have been received from Scotland, but it will probably be found there, as it is met with both in Denmark and Sweden.

17. Andrena Clarkella.

A. atra, hirsuta; thorace pedibusque posticis fulvis.

Melitta Clarkella, *Kirby, Mon. Ap. Angl.* ii. 130. 69 ♀.
Andrena dispar, *Zett. Ins. Lapp.* 460. 2.
Andrena bicolor, *St. Farg. Hym.* ii. 243. 12 (nec *Fabr.*).
Lucas, Explo. Sc. Algér. iii. 180. 82?
Andrena Clarkella, *Smith, Zool.* v. 1747. 36 ♂ ♀.
Nyland. Ap. Boreal. p. 212. 7 ♀.

Female. Length 5–6½ lines.—Black; the pubescence black, excepting that on the disk of the thorax, posterior tibiæ and tarsi, and a little at the base of the abdomen, which is fulvous; the wings subhyaline, their apical margins slightly clouded, the nervures ferruginous; the posterior tibiæ and tarsi fulvo-piceous; the intermediate tarsi fulvous beneath. Abdomen ovate, entirely black. B.M.

Var. *α*. The two basal segments fringed with fulvous pubescence.

Var. *β*. All the abdominal segments fringed with fulvous pubescence.

Male. Length 4½–5 lines.—Black; the pubescence on the clypeus pale fulvous, above which, as well as along the sides of the face, it is black; the disk of the thorax clothed with fulvo-ochraceous pubescence; on the metathorax and beneath it is pale fulvous; the wings hyaline, iridescent and faintly clouded

at their apical margins, the nervures pale ferruginous; the legs have a pale fulvous pubescence; the apex of the posterior tibiæ more or less pale testaceous within. Abdomen ovate-lanceolate, shining, and thinly clothed with long pale fulvo-ochraceous pubescence, the extreme apex pale testaceous. B.M.

In the Catalogue of British Hymenoptera, the name "*bicolor*" of Fabricius was adopted for this species, St. Fargeau and Lucas having done so; but I feel great pleasure in being able to retain that of *Clarkella*, particularly as Mr. Kirby named it in honour of Mr. Bracy Clark. Dr. Nylander having seen a typical specimen of the *A. bicolor* of Fabricius in Sehestedt's Museum, states that it is the insect named *A. æstiva*, and which Mr. Kirby had included in *M. Gwynana*, probably considering it a mere variety. On referring to the first description of *A. bicolor* in the 'Systema Entomologiæ,' we find that Fabricius says, "*affinis* et *succinctæ*, at abdomen immaculatum;" in all his subsequent works, the 'Entomologia Systematica' excepted, he has omitted this observation; from which it appears that *A. Clarkella* has no relation to the species described as *A. bicolor*. But Dr. Nylander has set the matter at rest.

No bee is known which has a wider geographical range than *A. Clarkella*; it is found in all parts of the United Kingdom, apparently preferring elevated situations; it occurs in France, Germany, Lapland, Finland, Denmark and Sweden; it has also been found in Algeria, and there is a series of specimens in the British Museum from Nova Scotia.

This bee is usually the first which appears in spring; as early as the 4th of March in 1849, but the weather that season was unusually mild; the general time for its appearance is about the third week of March. I have frequently dug both sexes out of the same burrow, and have more than once observed the sexes *in coitu*, first in 1840. Males are sometimes captured in spring before the snow has quite disappeared.

The female is subject to vary: the second variety is the colour of most of the specimens from Nova Scotia, and appears to be the common northern form of the species.

All the specimens received from Scotland belong to this latter variety.

Div. IV.—*Species having a fringe of long pale pubescence on the apical margins of the segments.*

18. Andrena Gwynana.

A. atra, villosa; thorace, abdomine antice, scopaque tibiarum posticarum ferrugineis.

Melitta Gwynana, *Kirby, Mon. Ap. Angl.* ii. 120. 60.
Melitta pilosula, *Kirby, Mon. Ap. Angl.* ii. 164. 65.
Andrena Gwynana, *Smith. Zool.* v. 1742. 27.
Nyland. Ap. Boreal. p. 213. 8.

Female. Length 5–5½ lines.—Black; the pubescence on the head black; the thorax above clothed with ferruginous pubescence; the wings subhyaline, their apical margins slightly clouded, the nervures ferruginous; the floccus pale ferruginous, the scopa fulvous. Abdomen subovate, the pubescence on the three basal segments ferruginous, their apical margins having a long fringe of the same colour; the apical fimbria sooty-black. B.M.

Male. Length 4–4½ lines.—The face clothed with a long dense black pubescence; the antennæ rather shorter than the thorax, which has a dull, pale ferruginous pubescence; the wings subhyaline, iridescent, and slightly clouded at their apical margins; the legs fusco-ferruginous, and having a thin pale ferruginous pubescence; the apical joints of the tarsi ferruginous. Abdomen ovate-lanceolate and having a scattered pale ferruginous pubescence. B.M.

This is not at all an uncommon species, but must be looked for early in the season; it appears about the end of March. Specimens have been received from Scotland.

19. Andrena bicolor.

A. atra, villosa; thorace, abdominis segmentis primis tribus parce rufo-hirtis; tibiis posticis rufis, scopa fulva.

Andrena bicolor, *Fabr. Syst. Ent.* p. 376. 4; *Spec. Ins.* i. 473. 6; *Mant. Ins.* i. 298. 7; *Ent. Syst.* ii. 310. 12; *Syst. Piez.* p. 326. 22.
Nyland. Revis. Ap. Boreal. 253. 11.
Andrena æstiva, *Smith, Zool.* vii. *Append.* p. 60.

Female. Length 4½–5½ lines.—Black; the face clothed with brown pubescence, the antennæ nigro-piceous beneath; the thorax has a pale ferruginous pubescence above as well as beneath; wings subhyaline, their nervures ferruginous; the legs fusco-ferruginous, the posterior tibiæ and the tarsi ferruginous; the floccus pale fulvous; the scopa fulvous, having a golden lustre; the abdomen ovate, finely punctured; the margins of the basal segments thinly fringed with pale fulvous pubescence; the apical fimbria sooty-black; the margins of the segments beneath have a pale fringe. B.M.

This insect, although resembling *A. Gwynana*, is distinct: the legs are of a different colour, the abdomen is punctured, and it is usually met with in June: in the Kirbian collection it stands along with *A. Gwynana*. The male is not known, probably it may be *A. pilosula* of Kirby.

20. Andrena helvola.

A. nigra; thorace, abdominisque basi fulvo-rufis, hirtis; tibiarum posticarum scopa flavescenti.

Apis helvola, *Linn. Faun. Suec.* p. 421. 1693 ♀; *Syst. Nat.* i. 955. 16, & *Cab. Mus. Linn. Soc.*
Fabr. Ent. Syst. ii. 310. 11; *Syst. Piez.* p. 326. 21.
Spin. Ins. Lig. fasc. i. p. 122. 9.
Melitta helvola, *Kirby*, *Mon. Ap. Angl.* ii. 119. 59. t. 15. f. 9 ♀.
Melitta angulosa, *Kirby*, *Mon. Ap. Angl.* ii. 127. 67 ♂.
Andrena helvola, *Rossi*, *Faun. Etrus.* ii. 97. 895.
Smith, *Zool.* v. 1742. 26 ♂ ♀.
Nyland. Supp. Ap. Boreal. p. 99; *Revis. Ap. Boreal.* p. 254. 16.

Female. Length 5–5½ lines.—Black; the pubescence on the clypeus pale fulvous, above and on the sides of the face it is fuscous; the mandibles ferruginous at their apex. Thorax clothed above with rufo-fulvous pubescence, at the sides and beneath it is griseous; the wings hyaline, their apical margins faintly clouded, the tegulæ and nervures ferruginous; the femora beneath fringed with white pubescence, the floccus white, the scopa pale fulvous, the apical joints of the tarsi ferruginous. Abdomen subovate, the pubescence at the base fulvous, beyond which it is cinereous; beneath, the margins fringed with cinereous pubescence. B.M.

Male. Length 5-5½ lines.—Black; the head wider than the thorax, subquadrate; the clypeus covered with long white pubescence, at the insertion of the antennæ it is pale fulvous;

the antennæ nearly as long as the thorax; the mandibles forcipate, subdentate at their base. Thorax thinly clothed above with rufo-fulvous pubescence; the wings hyaline, iridescent, faintly clouded at their apex, the nervures ferruginous, tegulæ rufo-piceous; the tarsi ferruginous. Abdomen shining, ovate-lanceolate, fulvous at the apex. B.M.

This species appears to be rather local; it is not uncommon near London about the end of April and the beginning of May; it is plentiful at the upper end of Millfield lane, by the side of Caen Wood. The colour of this species soon fades; the pubescence when first developed is a rich fulvous at the base of the abdomen, which contrasts very pleasingly with the silvery hue of the other parts. The male is the *M. angulosa* of Kirby, which soon becomes entirely hoary by exposure.

21. Andrena varians.

A. atra; thorace abdominisque basi hirsuto-fulvis; tibiarum posticarum scopa versicolori.

Apis varians, *Rossi, Mant.* no. 317.
Panz. Faun. Germ. 56. 12.
Melitta varians, *Kirby, Mon. Ap. Angl.* ii. 117. 58.
Andrena varians, *Smith, Zool.* v. 1741. 25.
Nyland. Ap. Boreal. p. 253. 13.

Female. Length 5–5½ lines.—Black; the pubescence on the head black, that on the clypeus brown. The thorax above clothed with rufo-fulvous pubescence; beneath and on the femora it is pale fulvous; the wings subhyaline, their apical margins slightly clouded, the nervures ferruginous; the floccus cinereous; the scopa fuscous above, and of a silvery whiteness beneath. Abdomen ovate, the pubescence at the base fulvous, posteriorly it is black; beneath, the segments margined with white pubescence. B.M.

Male. Length 4–5 lines.—Head wider than the thorax, the clypeus bearded with white pubescence, above it is pale fulvous; the mandibles forcipate, subdentate at their base; antennæ as long as the thorax. Thorax thinly clothed with rufo-fulvous pubescence. Abdomen ovate-lanceolate, having at its base a patch of fulvous pubescence; the apex fulvous. B.M.

There are some doubts of this being a distinct species from *A. helvola*; if specimens be examined agreeing with the descriptions, they will appear so undoubtedly, but on examining a series of varieties they commingle so gradually, that it is difficult to

say where the line is to be drawn which separates them; if the colour of the scopa alone is to be considered a good specific distinction, there will be no difficulty: but there are varieties of *varians* having the abdomen coloured as in *helvola*, the fringe on the ventral segments being white, whilst the scopa is fuscous above and white beneath. The male described as that of *varians* was taken *in coitu*; it is extremely like that of *helvola*, but its head above is not so quadrate, and its mandibles are subdentate. The species is retained with some hesitation; it is not rare in the London district during April and May, and is widely distributed.

22. Andrena atriceps.

A. nigra, griseo-pubescens; thorace rufescenti; tibiis posticis fulvis, scopa fulvo-aurea.

Melitta atriceps, *Kirby, Mon. Ap. Angl.* ii. 114. 55 ♂.
Melitta tibialis, *Kirby, Mon. Ap. Angl.* ii. 107. 52 ♀.
Andrena tibialis, *Smith, Zool.* v. 1737. 19 ♂ ♀.

Female. Length 6–7¼ lines.—Black; the clypeus and cheeks clothed with cinereous pubescence; at, and above the insertion of the antennæ it is slightly fulvous. Thorax clothed above with rufo-fulvous pubescence, at the sides and beneath it is griseous; the tegulæ rufo-piceous, the wings subhyaline, having frequently a fulvous tinge; their apical margins faintly clouded; the fringe on the femora and the floccus white; the posterior tibiæ and the tarsi rufo-fulvous, the scopa bright fulvous. Abdomen subovate, the apical margins of the segments depressed, shining, covered with a short griseous pubescence, and having a fringe of the same colour on the apical margins of the segments; the apical fimbria fuscous; beneath, the margins are ciliated with white. B.M.

Male. Length 5–6½ lines.—Black; the face clothed with black or dark brown pubescence, the cheeks have a long beard of pale fulvous pubescence; the antennæ nearly as long as the thorax, the joints of the flagellum subarcuate, the thorax has a rufo-fulvous pubescence; the wings as in the other sex; the tarsi and the apex of the posterior tibiæ rufo-testaceous. Abdomen ovate-lanceolate, shining, and thinly sprinkled with pale fulvous pubescence, the segments having a thin fringe of the same colour; the apex fulvous. B.M.

Var. *a.* The posterior tibiæ rufous half their length, sometimes almost entirely rufous.

Having on several occasions captured the sexes *in coitu*, there can be no hesitation in uniting these insects. The species is extremely abundant, and is found in all parts of the kingdom. It usually makes its appearance in the beginning of April; males are sometimes taken at the latter end of March.

23. Andrena Mouffetella.

A. nigra, pallido-pubescens; abdomine piloso, nigro-æneo; thorace rufescenti-piloso; tibiis posticis rufis.

Melitta Mouffetella, *Kirby, Mon. Ap. Angl.* ii. 108. 53.
Andrena Mouffetella, *Smith, Zool.* v. 1738. 20.

Female. Length 6–7 lines. — Black; the face clothed with griseous pubescence, intermixed with fulvous, that on the cheeks white. Thorax: above, the pubescence is rufo-fulvous, at the sides and beneath white; the wings hyaline, their apical margins faintly clouded, the nervures pale testaceous; the legs have a pale rufous pubescence, the fringe on the femora and the floccus white; the posterior tibiæ, the apical joints of the anterior tarsi, and the intermediate and posterior pairs rufous, the scopa fulvous. Abdomen nigro-æneous, subovate, very convex, thinly covered with short, pale, fulvous pubescence, the apical margins of the segments having a fringe of the same colour.

Male. Length 5 lines.—The face has a brown pubescence, the antennæ as long as the thorax, the joints subarcuate. Thorax: above having a pale fulvous pubescence; the wings as in the female; all the tarsi and the posterior tibiæ ferruginous. Abdomen ovate-lanceolate, having a dense pale fulvous pubescence.

This species is rare: a specimen was captured on Holdershot Heath, near Farnborough, in 1849. It resembles *A. atriceps*, but the female as well as the male are much more pubescent; the abdomen being densely covered with short pale pubescence has a nigro-æneous tinge; it may be known from *atriceps* by not having the apical margins of the abdomen depressed.

24. Andrena nigro-ænea.

A. nigra, fulvo-pubescens; capite anoque atris; abdomine subhirsuto, nigro-æneo.

Melitta nigro-ænea, *Kirby*, ii. 109. 54 ♀.
Sowerby, Brit. Miscel. i. 77. t. 38.
Andrena nigro-ænea, *Smith, Zool.* v. 1739. 2 ♂ ♀.

Female. Length 6–6½ lines.—Black; the pubescence on the face dark brown, above the insertion of the antennæ and at the sides it is black; on the cheeks, margin of the vertex and thorax above the pubescence is fulvous; on the sides and on the femora it is paler; the scopa bright fulvous, the pubescence on the tarsi dark fuscous; the wings subhyaline, their nervures rufo-testaceous. Abdomen nigro-æneous, ovate, and thinly clothed with fulvous pubescence; the margins have a fringe of the same colour; the apical fimbria black. B.M.

Male. Length 5–6 lines.—The face clothed with reddish brown pubescence; the antennæ not quite so long as the thorax, the joints subarcuate; the legs and thorax have a fulvous pubescence, not so bright as in the female; the abdomen nigro-æneous, ovate, and thinly covered with fulvous pubescence; towards the apex it is black. B.M.

This species is very abundant in the London district; whether it occurs in the north of England is not known, but it has been received from Ireland; it appears in April, and may be frequently captured on the Dandelion. To the entomologist, this bee will always possess an additional interest, from the fact of its being the species on which Kirby first observed the *Stylops Melittæ*; it is remarkable that amongst the number of species which I have captured attacked by *Stylops*, I never found *A. nigro-ænea* infested by the parasite.

25. Andrena Trimmerana.

A. nigra, griseo-rufescenti-pubescens; tibiis posticis versicoloribus.

Melitta Trimmerana, *Kirby, Mon. Ap. Angl.* ii. 116. 57 ♀.
Andrena Trimmerana, *Smith, Zool.* v. 1740. 23 ♂ ♀.
Nyland. Revis. Ap. Boreal. p. 252. 9.

Female. Length 5½–6 lines.—Black; the face clothed with dark brown pubescence, at the sides and above the insertion of the antennæ it is black; the antennæ half the length of the thorax, which is clothed above with rufo-fulvous pubescence; the wings hyaline, their apical margins slightly clouded; the legs have a fuscous pubescence above, the femora fringed with pale fulvous; the floccus, and the scopa beneath glittering silvery-white, the latter dark fuscous above, the apical joints of the tarsi ferruginous. Abdomen ovate, thinly covered with pale fulvous pubescence, the apical fimbria black, or dark brown; the margins of the segments beneath testaceous and thinly fringed with pale pubescence. B.M.

Male. Length 5–6 lines.—The head wider than the thorax; the mandibles forcipate and having a minute tooth at their base, the tips ferruginous; the face has a reddish-brown pubescence at the sides, intermixed with black above the clypeus: the antennæ as long as the thorax, the joints of the flagellum arcuate. Thorax shining, the pubescence on the disk sparing, rufo-fulvous, at the sides and beneath much paler, as well as that on the legs: the apical joints of the tarsi rufo-testaceous. Abdomen shining, lanceolate, and having a tuft of pale ferruginous pubescence on the basal segment, the margins of the two first segments usually slightly depressed, a thin pubescence is scattered over the abdomen, particularly at the sides, the apex rufo-testaceous and having a little fulvous pubescence. B.M.

This species has several striking specific characteristics; the female is distinguished by its unusually long antennæ, and by its scopa being black above, and silvery beneath; the male also has its antennæ more elongate than usual, and has a tuft of pubescence at the base of the abdomen, like the male of *A. fulva*: its face has dark pubescence, that of *fulva* is white, and the tooth, usually found at the base of its mandibles beneath, is much shorter than in *fulva*, sometimes reduced to a sharp angle.

This bee is very abundant near London, particularly on Hampstead Heath: it is frequently infested by *Stylops Melittæ*, of which I have twice succeeded in obtaining a male from it, and have kept the *Andrena* from three to four weeks alive by supplying it daily with fresh flowers; by these means the male *Stylops* may be obtained, or the female may be observed producing a multitudinous host of larvæ.

This species has been received from Ireland; it appears to be generally distributed. Specimens from Scotland have the pubescence much darker coloured, that on the scopa of the female above, and also that on the face of the male, is black. This variety is from Loch Rannoch, Perthshire.

26. Andrena conjuncta.

A. nigra, thorace rufescenti-piloso; tibiis posticis rufo-testaceis, scopa fulvo-aurea.

Andrena conjuncta, *Smith, Zool.* v. 1744. 31.

Female. Length 5½ lines.—Black; the face thinly clothed with dark fulvo-ferruginous pubescence; the clypeus and thorax above strongly punctured; the metathorax has at its base a

rugose space, enclosed by a sharp ridge; the antennæ have the flagellum nigro-piceous towards the apex beneath, and are half the length of the thorax; the thorax thinly clothed above with short fulvous pubescence, at the sides it is shorter and paler; the pubescence on the femora beneath and also the floccus, pale fulvous; the scopa bright fulvous; the tarsi beneath fulvo-ferruginous, the apical joints of the tarsi ferruginous; wings hyaline, their nervures pale rufo-testaceous. Abdomen ovate, shining and rather strongly punctured; the margins of the segments depressed, and having a thin sparing fringe of pale fulvous pubescence; the apical fimbria fusco-ferruginous.

This insect might be mistaken for a small example of *A. atriceps*, female; but the description will at once point out the difference. A single specimen has been captured near Colney Hatch: there are one or two in the collection of Mr. Desvignes, who does not know their locality.

27. Andrena spinigera.

A. atra, fulvo-pilosa; thorace fulvescenti; abdomine fusco; pedibus rufo-fuscis, pilosis.

Melitta spinigera, *Kirby, Mon. Ap. Angl.* ii. 123. 63 ♂.
Andrena spinigera, *Smith, Zool.* v. 1669. 7 ♂ ♀.

Female. Length 5½–6 lines.—Black; the face and cheeks thinly clothed with fulvous pubescence, the apical half of the mandibles ferruginous. Thorax thinly clothed above with fulvous pubescence; the metathorax and sides have pubescence of a lighter tint; wings hyaline, the nervures pale ferruginous, the tegulæ rufo-piceous; the legs dark rufo-testaceous, their pubescence fulvous; the floccus and scopa beneath fulvous, the latter fuscous above. Abdomen: the apical margins of the two basal segments rufo-testaceous; two minute dots of the same colour on the basal segment; the abdomen has a scattered fulvous pubescence; beneath, ferruginous at the base.

Male. Length 5–5½ lines.—Black; the pubescence pale fulvous; head usually much wider than the thorax, the face densely clothed with black pubescence; the mandibles forcipate, and armed at their base with a long acute spine, their tips ferruginous; antennæ about the length of the thorax, the joints of the flagellum subarcuate. Thorax: the wings hyaline and iridescent, the nervures pale ferruginous; legs fusco-ferruginous, the apical joints of the tarsi paler. Abdomen lanceolate, shining,

and having a scattered pale fulvous pubescence, the margins of the segments rufo-testaceous. B.M.

I feel pretty sure that I am correct in assigning the female described to *A. spinigera*; they were found at the same time and in the same locality. The female closely resembles *A. Trimmerana*, but the different colour of their scopæ distinguishes them at once. Mr. Kirby describes his insect as a female: this is an oversight. The species is very local, and apparently not very numerous; it occurs however in the neighbourhood of Highgate, and has also been captured in Epping and Hainault Forests, and in the New Forest, Hampshire.

28. Andrena picicornis.

A. nigra, grisescenti-subvillosa; capite atro; antennis piceis; abdomine fusco.

Melitta picicornis, *Kirby, Mon. Ap. Angl.* ii. 123. 62.
Andrena picicornis, *Smith, Zool.* v. 1745. 33.

Female. Length 5½–6 lines.—Black; the face clothed with black pubescence, that on the margin of the clypeus is obscure fulvous; the flagellum rufo-piceous. Thorax thinly clothed with obscure fulvo-ochraceous pubescence, paler on the metathorax and on the sides; the wings fulvo-hyaline, the nervures pale ferruginous; the legs rufo-testaceous, having a pale fulvous pubescence beneath, the floccus of the same colour; the scopa fulvous; the apical joints of the tarsi ferruginous, their pubescence beneath ferruginous. Abdomen ovate, fuscous, shining, and having a scattered pale fulvous pubescence, the margins of the segments rufo-testaceous; the apical fimbria fuscous. B.M.

Male. Length 5 lines.—Very closely resembling the female, but more elongate, the face clothed with ferruginous pubescence; the antennæ shorter than the thorax, the joints of the flagellum subarcuate; the legs rufo-piceous, the posterior tibiæ and the tarsi rufo-fulvous, their pubescence fulvous. Abdomen elongate-ovate, shining, the margins of the segments obscurely rufo-testaceous, those of the three basal segments have a sparing pale fringe, on the fourth and fifth it is longer and more dense, the pubescence on the two apical segments fuscous, mixed with a few fulvous hairs at the apex.

This appears to be a very local species. Mr. Walcott captured it near Brighton; all the examples which I have seen

have been attacked by *Stylops*: of two males and one female, the latter has a female *Stylops* in its abdomen; one of the former has the marks of two males having escaped from it, the other appears to have had but one. Some species of *Andrena* appear to be always attacked, others occasionally, whilst a few appear to escape entirely.

29. Andrena bimaculata.

A. nigra, rufescenti-villosa; capite atro; ventre basi utrinque macula rufa notato.

Melitta bimaculata, *Kirby, Mon. Ap. Angl.* ii. 115. 56.
Andrena bimaculata, *Smith, Zool.* v. 1739. 22.

Male. Length 5½ lines.—Black; the pubescence of the head black, brownish on the clypeus: antennæ nearly as long as the thorax, the joints of the flagellum subarcuate. Thorax: above clothed with obscure ferruginous pubescence, on the sides and beneath it is paler; wings subhyaline, faintly clouded at their apical margins, the nervures pale ferruginous. Abdomen ovate-lanceolate, the margins of the segments obscurely testaceous; thinly covered with pale ferruginous pubescence; beneath, the second segment has two red spots. B.M.

This male most closely resembles that of *A. Trimmerana*, but is certainly distinct; it has no tooth at the base of the mandibles. Only two specimens are known,—the typical one, and that in the British Museum.

30. Andrena Smithella.

A. nigra, grisescenti-subhirsuta; thorace abdomineque hirsuto-fulvescentibus; segmentorum marginibus pallidis.

Melitta Smithella, *Kirby, Mon. Ap. Angl.* ii. 131. 70.
Andrena Smithella, *Smith, Zool.* v. 1748. 37.

Female. Length 5–6 lines.—Black; the pubescence on the face pale fulvous, a few scattered black hairs on the vertex. Thorax: above, clothed with rufo-fulvous pubescence: the tegulæ nigro-piceous, the wings hyaline, faintly clouded at their apical margins, the nervures ferruginous; the legs have a pale fulvous pubescence, the floccus and scopa beneath bright pale fulvous, having in certain lights a silvery hue; above, slightly fuscous. Abdomen ovate, slightly depressed, the segments having, except at their base, a long, suberect, pale fulvous pubescence; the

margins of the segments obscurely testaceous; the apical fimbria ferruginous. B.M.

Male. Length 3½ lines. — Black; the head subquadrate, the margin of the vertex deeply emarginate; the mandibles at their base, beneath, having a large angular tooth; the face and cheeks thinly clothed with long cinereous pubescence; the joints of the antennæ subarcuate. The thorax and legs thinly covered with long cinereous pubescence; the wings hyaline, their nervures pale rufo-testaceous; the apical joints of the tarsi rufo-testaceous. Abdomen oblong-ovate, shining, the apical margins of the segments obscurely rufo-piceous. B.M.

This is a rare species and extremely local; it has been once or twice met with at Weybridge. *A. Smithella* resembles *A. Lapponica*, but if the abdomen be viewed sideways, the yellow pubescence will be seen to form suberect bands, the base of the segments being naked. Mr. Grant captured both sexes at Wimbledon Common, in April 1854.

31. Andrena Lapponica.

A. nigra, fulvescenti-subpilosa; thorace abdominisque basi fulvescentibus.

Andrena Lapponica, *Zett. Ins. Lapp.* p. 460. 4.
Andrena apicata, *Smith, Zool.* v. 1748. 38.

Female. Length 5–5½ lines.—Black; the pubescence on the clypeus obscure fulvous, at the sides and on the vertex it is black; the antennæ nigro-piceous beneath. Thorax: the pubescence on the disk fulvo-ferruginous, at the sides and on the metathorax pale fulvous; the tegulæ fulvo-piceous, the wings hyaline, slightly clouded on their apical margins, the nervures ferruginous; the pubescence on the legs beneath, pale fulvous, above, slightly fuscous; the floccus dense and pale fulvous; the tarsi beneath ferruginous; the scopa bright fulvous beneath. Abdomen ovate and densely pubescent towards the base; the pubescence fulvous; towards, and at the apex it is black. B.M.

Male. Length 3½–4½ lines.—The pubescence on the clypeus pale fulvous, at the sides and above it is dark fuscous, or black; at the sides of the head it is black, but pale on the cheeks beneath; the mandibles forcipate, and armed at their base with a short acute tooth, tips of the mandibles ferruginous; the pubescence on the thorax pale fulvous, somewhat obscure on the

disk; the legs fusco-ferruginous, the tarsi palest, the wings as in the other sex. Abdomen ovate-lanceolate, shining, and pubescent towards the base, beyond the second segment nearly naked, the apical fimbria fulvous; beneath, the margins have a narrow fringe of pale fulvous pubescence. B.M.

The first specimens of this insect were taken by the Rev. W. Little in Scotland. I was not aware at that time that the species had been described by Zetterstedt, and therefore gave it another name. Mr. Walcott has taken both sexes in the neighbourhood of Bristol; it has not occurred near London.

32. Andrena nigriceps.

A. atra; thorace fulvo; abdomine fasciis quatuor villoso-rufescentibus.

Melitta nigriceps, *Kirby, Mon. Ap. Angl.* ii. 134. 73 (nec ♂).
Andrena nigriceps, *Smith, Zool.* v. 1749. 40.

Female. Length 5 lines.—Black; the pubescence on the head black; on the posterior margin of the vertex a thin fringe of fulvous pubescence; the flagellum nigro-piceous beneath. Thorax densely clothed with rufo-fulvous pubescence, paler on the metathorax and sides; the tegulæ ferruginous, the wings hyaline, their apical margins faintly clouded, the nervures ferruginous; the legs have a black pubescence. Abdomen ovate, subdepressed, the four basal segments with a broad fascia of fulvous pubescence, that on the fifth and apical segment is black. B.M.

This species appears to be extremely local or rare. Mr. Dale captured two or three at Bournemouth a few years ago; there is also a specimen in the British Museum. It is a very marked and beautiful insect, very closely resembling *A. simillima.*

33. Andrena simillima.

A. atra; capite pallido-villoso; thorace fulvo, abdomine fasciis quatuor fulvescentibus.

Andrena simillima, *Smith, Cat. Brit. Hym. Append.* p. 122.

Female. Length 5 lines.—Black; the pubescence on the face pale fulvous, that on the vertex bright fulvous; one or two of the apical joints of the flagellum piceous beneath; the clypeus

coarsely punctured; the disk of the thorax clothed with bright fulvous pubescence, on the metathorax and sides it is paler; the wings hyaline, faintly clouded at their apical margins, the nervures ferruginous; the femora fringed with pale pubescence, the floccus white, the scopa fuscous; the calcaria pale testaceous, the apical joints of the tarsi ferruginous. Abdomen oblong-ovate, with a little fulvous pubescence at the base; the three following segments have a broad fascia of pale fulvous pubescence; the pubescence on the two apical segments black. B.M.

Male. Length 4 lines.—Black; the face clothed with pale pubescence, on the clypeus anteriorly it is white, the anterior margin of the clypeus emarginate, and produced at the lateral angles into a sharp tooth; the labrum bidentate; the mandibles forcipate, their tips ferruginous; the antennæ rather shorter than the thorax, the latter clothed with a thin fulvous pubescence; beneath it is white; the wings as in the female; the tarsi ferruginous beneath, their apical joints rufo-testaceous. Abdomen ovate-lanceolate, the margins thinly fringed with pale pubescence, the apex fulvous.

This species was discovered at the land-slip near Luccomb Chine in the Isle of Wight, in July 1851: shortly afterwards Mr. Baly took both sexes at Folkestone in Kent.

34. Andrena pubescens.

A. nigra, pallido-subvillosa; thorace fulvo; abdominis segmentis margine albidis; antennis subtus, plantisque, rufis.

Melitta rufitarsis, *Kirby, Mon. Ap. Angl.* ii. 136. 74 (var. ♀).
Melitta fuscipes, *Kirby, Mon. Ap. Angl.* ii. 136. 75 ♀.
Melitta pubescens, *Kirby, Mon. Ap. Angl.* ii. 141. 80 ♂.
Andrena fuscipes, *Smith, Zool.* v. 1751. 43 ♂ ♀.
Andrena rufitarsis, *Smith, Zool.* v. 1750. 42.

Female. Length 5 lines.—Black; the face clothed with pale fulvous pubescence, a line of pale downy pile along the inner margins touching the eyes; the flagellum more or less fulvous beneath. Thorax: the disk clothed with fulvous pubescence, on the sides of the metathorax it is much paler; the tegulæ rufo-testaceous, the wings subhyaline, slightly clouded at their apical margins, the nervures rufo-piceous; the legs rufo-testaceous, having a fuscous pilosity above; the floccus yellowish-white; the scopa pale fulvous beneath; the apical joints of the tarsi testaceous. Abdomen subovate, the basal segment covered with pale fulvous

pubescence, and the three following segments having a fascia of the same; the apical fimbria rufo-fuscous.

Male. Length 4 lines.—The face has a dense white pubescence; on the thorax it is ochraceous, very pale on the sides and beneath; the wings hyaline and iridescent; legs as in the female; the abdomen lanceolate and covered with a long, dense, pale yellow pubescence. B.M.

Having carefully examined a large number of this species, it appears certain that *A. rufitarsis* and *A. fuscipes* are the same, the former being merely a brighter variety, frequently met with on the first appearance of the insect: Mr. Kirby himself, subsequently to the publication of his 'Monograph,' was of the same opinion, as in his own interleaved copy there is a note to that effect. *M. pubescens* of Kirby is the male, but whether it is synonymous with the *Apis pubescens* of Fabricius admits of some doubt. This bee appears to confine itself to open sandy heaths; it abounds on all the heaths in Hampshire during July and August; it is also very common at Weybridge, where it forms large colonies; it must be borne in mind that exposure soon bleaches bees of a fulvous clothing, and this, which delights in the sunniest weather, is frequently met with quite grey, the males being sometimes white. This species seldom frequents any flowers, except those of the purple heath.

35. Andrena angustior.

A. nigra, subvillosa; thorace fulvo-pubescenti; femoribus, pedibusque quatuor anticis, piceis, posticis ferrugineis.

Melitta angustior, *Kirby, Mon. Ap. Angl.* ii. 122. 61 ♀.
Andrena angustior, *Smith, Zool.* v. 1745. 32.
Nyland. Revis. Ap. Boreal. p. 254. 17.
Andrena lacinia, *Smith, Zool.* v. 1751. 44, var.

Female. Length 4½–5 lines.—Black; the face clothed with obscure fusco-ferruginous pubescence, the flagellum nigro-piceous. Thorax: the disk clothed with fulvous pubescence, on the metathorax and sides it is much paler, as well as on the femora beneath; tegulæ piceous, wings subhyaline, faintly clouded at their apical margins, the floccus pale yellowish-white; the scopa pale fulvous. Abdomen ovate, fuscous, the apical margins of the segments sparingly fringed with pale fulvous pubescence; the apical fimbria fuscous. B.M.

Male. Length 4 lines.—The face thinly clothed with pale fulvous pubescence, the antennæ half the length of the thorax, the

latter having a very pale fulvous pubescence on the disk, on the sides it is white; the wings as in the female; legs nigro-piceous; the apical joints of the anterior and intermediate tarsi, and the whole of the posterior pair, fulvous. Abdomen elongate, lanceolate, shining, and having the apical margins of the segments depressed and thinly fringed with griseous pubescence; the extreme apex ferruginous. B.M.

This is a rare species: it is occasionally met with at Highgate, in company with the male described. There is very little doubt of the male described by Kirby being that of *A. atriceps*. This bee appears in May. *A. lacinia* of Smith is only the present species in very fine condition.

36. Andrena denticulata.

A. atra, pallide fulvo-pilosa; thoracis disco sparsim fulvo-piloso; abdominis segmentis marginibus pallide fulvis.

Melitta denticulata, *Kirby, Mon. Ap. Angl.* ii. 133. 72 ♂.
Melitta Listerella, *Kirby, Mon. Ap. Angl.* ii. 137. 76 ♀.
Andrena Listerella, *Smith, Zool.* v. 1752. 45 ♂ ♀.
Nyland. Ap. Boreal. p. 219. 17.

Female. Length 5–5½ lines. — Black; the face has a short, pale fulvous pubescence; the flagellum, except the three basal joints, fulvous beneath. Thorax: the disk very sparingly covered with fulvous pubescence, paler at the sides, and very dense at the sides of the metathorax; the tegulæ nigro-piceous, the wings subhyaline, slightly fulvous, the nervures ferruginous, the apical margins clouded; legs nigro-piceous, sometimes rufo-piceous, the femora fringed with pale fulvous pubescence, the floccus dense, and of a pale yellow, the scopa and the tarsi beneath bright fulvous; the apical joints of the tarsi ferruginous. Abdomen subovate, slightly depressed, the apical margins of the segments have a fascia of yellowish-white pubescence, the apical fimbria fusco-ferruginous. B.M.

Male. Length 4 lines.—Black; the face covered with thin ochraceous pubescence; the labrum produced; a minute tooth on each side on the anterior margin of the clypeus; the mandibles forcipate, armed at their base with a minute tooth, their tips ferruginous; the flagellum fulvo-piceous beneath. Thorax: the pubescence ochraceous; the wings subhyaline; the tarsi bright fulvous beneath; the apical joints of the tarsi rufo-testaceous. Abdomen lanceolate and shining; the three inter-

mediate segments have a narrow white marginal fascia; the apex has a little fusco-ferruginous pubescence. B.M.

This species is rare: it has been twice met with, once in Hampshire in August, where the sexes were captured on the flowers of the Wild Briony; it has also occurred at Southend in July. From the above circumstance, and the general resemblance of the two sexes, there can be no hesitation in uniting them.

37. Andrena tridentata.

A. nigra, fulvo-subvillosa; labio tridentato; tarsis testaceis.

Melitta tridentata, *Kirby, Mon. Ap. Angl.* ii. 132. 71.
Andrena tridentata, *Smith, Zool.* v. 1749. 39.

Male. Length 4¼ lines.—Black; the face covered with long pale yellowish-white pubescence; the mandibles forcipate; the labrum produced in the middle and concave in front; the clypeus has on each side an obtuse tooth; the antennæ towards the apex nigro-piceous beneath. Thorax clothed above with rufo-fulvous pubescence; the wings hyaline, slightly clouded at their apical margins; the legs rufo-piceous, with a pale fulvous pubescence; the tarsi rufo-testaceous. Abdomen subovate, the margins fringed with pale pubescence, between which the pubescence is fulvous.

Mr. Kirby suspects that this may be the male of *A. Smithella*, the female of which he met with frequently in 1799, but makes no further mention of the date; the time of appearance is of considerable moment in the determination of these affinities; specimens of *A. Smithella*, females, were taken in April 1854, and Mr. Kirby says that he captured *A. tridentata* in August; therefore great doubt exists of its being the male of *A. Smithella*. Probably this is a mere variety of *A. denticulata*, in finer condition, and the absence of the minute tooth at the base of the mandibles is no greater range of variation than is frequently met with.

38. Andrena fucata.

A. nigra, cinerascenti-pilosa; thorace pallide rufescenti-hirto; abdominis pedumque posticorum apicibus pallide fuscis.

Andrena fucata, *Smith, Zool.* v. 1743. 28.
Andrena clypeata, *Nyland. Ap. Boreal.* p. 215. 12; *Revis. Ap. Boreal.* p. 254. 15.

Female. Length 5–6 lines.—Black; the face covered with griseous pubescence, that on the vertex fulvous, a line of silvery pile on each side of the face in the depressions close to the margins of the eyes; the clypeus strongly punctured, having a smooth line down the centre, the anterior margin deeply emarginate, and produced on each side into a sharp angle. Thorax thinly clothed with pale fulvous pubescence, most dense on the scutellum; at the sides of the metathorax it is paler; wings subhyaline, their apical margins clouded; legs dark fuscous, the floccus white; the scopa obscure fulvous above, beneath silvery; the legs have a scattered pale fulvous pubescence, that on the tarsi beneath ferruginous, their apical joints rufo-testaceous. Abdomen: at the base, thinly clothed with cinereous pubescence, on the intermediate portion it is fuscous but very sparing, a few scattered cinereous hairs at the sides; on the fifth and apical segments it is fuscous, the margins of the segments obscure testaceous. B.M.

This very distinct species is not found in the London district; it appears to be plentiful in Scotland, and has been received from Bristol, but it is not quite certain that the specimens were captured there; it is more probably quite a northern species, as it is found in Sweden, Denmark and Finland.

Div. V.—*Abdomen subpubescent: males only known.*

39. Andrena picipes.

A. nigra, pallido-villosa; thorace fulvescenti; abdomine fusco; pedibus rufo-piceis.

Melitta picipes, *Kirby, Mon. Ap. Angl.* ii. 127. 66.
Andrena picipes, *Smith, Zool.* v. 1746. 34.

Male. Length 4 lines.—Black; the head larger than the thorax, the face covered with a white pubescence; the mandibles forcipate. Thorax above clothed with fulvous pubescence, the legs rufo-piceous, their pubescence pale. Abdomen fuscous, shining and pilose. B.M.

Of this species there is no specimen in the Kirbyan collection, but some suspicion arises that it may be a male of *A. helvola.*

40. Andrena clypeata, n. s.

A. hirsutissima, fuscescens, clypeo albo-barbato ; abdomine pallido-lanato.

Male. Length 4 lines.—Black ; head as wide as the thorax, covered with long fuscous pubescence, the clypeus having a long white beard; the mandibles forcipate, their tips ferruginous, produced at their base beneath into a large angular tooth ; the antennæ as long as the thorax, the flagellum piceous beneath, the joints subarcuate. Thorax clothed above with long fuscous pubescence ; the wings subhyaline, iridescent, faintly clouded at their apex, the nervures pale ferruginous ; legs obscure rufo-testaceous, the femora have a long pale pubescence ; the apical joints of the tarsi pale rufo-testaceous, the tibiæ and tarsi having a scattered glittering yellowish-white pubescence. Abdomen lanceolate, subpetiolate, shining, and having a loose scattered pale pubescence, the apex has a little glittering yellowish-white pubescence.

This insect was received from Scotland; it is a very distinct and marked species, and easily recognized ; only one specimen has occurred.

41. Andrena constricta.

A. nigra, nitida, cinerascenti-pilosa, tibiis tarsisque posticis fulvis ; abdominis segmentorum trium intermediorum marginibus basi constrictis.

Andrena constricta, *Smith, Zool.* vii. *App.* p. 59.

Male. Length 4 lines.—Black ; antennæ as long as the thorax, rufo-piceous beneath, the joints subarcuate ; the clypeus coarsely punctured, the face having a scattered pale yellow pubescence. Thorax punctured and shining, the metathorax having a thin griseous pubescence; the wings subhyaline, having a fulvous tinge, the tegulæ and nervures rufo-testaceous. Abdomen ovate, rather strongly punctured, the margins of the three intermediate segments depressed, and rufo-testaceous, the extreme apex fulvo-piceous, and having a glittering pale pubescence; the legs rufo-testaceous, sprinkled with a pale glittering pubescence ; the posterior tibiæ and all the tarsi fulvo-piceous; the tibiæ have a fuscous stain beneath.

This very distinct insect was captured by the Rev. W. Little at Kirkpatrick-Juxta ; it is quite possible that it may prove to

be the male of the *A. rufitarsis* of Zetterstedt, but the description of that sex, as given by Nylander, is not sufficiently detailed.

42. Andrena frontalis.

A. nigra, nitida, cinerascenti-pilosa; clypeo albo; pedibus nigris.

Andrena frontalis, *Smith, Zool.* vii. *App.* p. 59.

Male. Length 4 lines.—Black; the head wider than the thorax, the clypeus white, and having on each side an angular black spot; the face has a thin griseous pubescence. Thorax shining, and having some scattered punctures, at the sides a thin griseous pubescence; the wings subhyaline, iridescent, the nervures ferruginous; the legs have a glittering hoary pubescence, the claws ferruginous, the calcaria pale testaceous. Abdomen ovate-lanceolate, punctured and glossy; the margins of the intermediate segments depressed and rufo-testaceous; the extreme apex covered with pale glittering pubescence: beneath, the third, fourth and fifth segments are ciliated with short fulvous hairs; towards the base, rufo-piceous.

This species most closely resembles the male of *A. analis*, but may at once be distinguished by its black posterior tarsi and the fulvous cilia on the ventral segments. Mr. Samuel Stevens took this insect in Devonshire.

43. Andrena Aprilina.

A. nigra; thorace fulvo-piloso; abdomine nitido, segmentorum marginibus testaceis; tarsis ferrugineis.

Andrena Aprilina, *Smith, Zool.* vi. 2211.

Male. Length 4½ lines.—Black; the clypeus clothed with brown pubescence, at the base of the antennæ and on the vertex it is fulvous; the antennæ a little shorter than the thorax, the joints subarcuate. Thorax clothed with fulvous pubescence, sparingly so on the disk, and palest at the sides of the metathorax; the wings subhyaline, their nervures testaceous; the legs have a fulvous pubescence, the tarsi ferruginous. Abdomen oblong-ovate, shining, the margins of the segments piceous, the second and third depressed; all the margins thinly fringed with fulvous pubescence; the extreme apex covered with fuscous pubescence.

This species is in the collection of Mr. Dale, of Glanvilles Wootton.

Div. VI.—*The segments of the abdomen having marginal fasciæ.*

A. *The fasciæ concolorous with the pubescence of the thoraæ.*

44. Andrena fulvicrus.

A. nigra, pallide fulvo-villosa; abdomine fasciis tribus pallidis; tibiarum posticarum scopa fulva.

Melitta fulvicrus, *Kirby, Mon. Ap. Angl.* ii. 138. 77 ♂ ♀.
Melitta contigua, *Kirby, Mon. Ap. Angl.* ii. 140. 79 ♂ var.
Andrena fulvicrus, *Smith, Zool.* v. 1916. 46.
Andrena articulata, *Smith, Zool.* v. 1750. 41, var. ♂.

Female. Length 4½–5¼ lines.—Black; the clypeus has a clothing of fulvous pubescence, above which it is black. Thorax: the disk thinly clothed with fulvous pubescence, on the sides and metathorax it is paler; wings hyaline, the nervures ferruginous, the tegulæ piceous; the pubescence on the legs rufous, the scopa fulvous, the claws ferruginous, the pubescence on the tarsi beneath ferruginous, the floccus pale fulvous. Abdomen ovate, shining, closely and finely punctured; the margin of the basal segment and those of the three following have a fascia of pale fulvous pubescence, that on the basal segment usually more or less obliterated; the apical fimbria sooty-black. B.M.

Male. Length 3½–5 lines.—Black; the face densely clothed with black pubescence, usually intermixed with a few fulvous hairs; antennæ half the length of the thorax, the latter clothed with pale fulvous pubescence, palest on the sides and on the legs. Abdomen ovate-lanceolate, closely punctured; the apical margins of the segments, which are slightly depressed, have a fascia of ochraceous pubescence; the entire abdomen has a short scattered pubescence of the same colour; the sixth and apical segments have a little dark fuscous pubescence, the extreme apex ferruginous. B.M.

Var. *a.* Length 5¼ lines.—The flagellum, except the basal joint, rufo-piceous beneath; the mandibles and apical joints of the tarsi ferruginous; the fasciæ of the abdomen white; the abdomen very shining and punctate.

This is a very abundant species in the London district, and appears to be generally distributed over the country. It has been received from Scotland. The males vary considerably in size as well as in colour; when long exposed they become entirely hoary. Mr. Kirby's *M. contigua* is certainly a worn specimen of the male; and it is pretty certain that *A. articulata* is

not distinct, but it differs in several particulars from the usual appearance of the insect; it is the var. *a*. I have frequently captured the sexes *in coitu*.

45. Andrena extricata.

A. nigra, grisescenti-villosa; abdomine fasciis tribus albis; tibiarum posticarum scopa fulva.

Andrena extricata, *Smith, Zool.* vii. *App.* 59.

Female. Length 5 lines.—Black; the face clothed with short pale fulvous pubescence, on the vertex it is fulvous. Thorax clothed with pale fulvous pubescence, that on the legs is of the same colour, the apical joints of the tarsi rufo-piceous, the claws ferruginous; the floccus yellowish-white, the scopa fulvous; the wings hyaline, their apical margins faintly clouded, the nervures ferruginous. Abdomen closely punctured, the basal and three following segments have a white marginal fascia, the first more or less obliterated, the apical fimbria fuscous.

Male. Length 4 lines.—The face has a bright fulvous pubescence, on the vertex it is fuscous; on the thorax and legs it is pale fulvous, the apical joints of the tarsi ferruginous; the wings hyaline, the nervures pale ferruginous. Abdomen ovate-lanceolate, very glossy, the segments have white marginal fasciæ, the apex fulvous.

This very closely resembles the preceding species, and it is difficult to point out more than what might constitute a permanent variety, but it has not occurred near London, where *A. fulvicrus* abounds; the male is most distinct; the difference in colour is not the effect of exposure, the specimens described being in the most recent and beautiful condition.

This insect has been met with in the north of England, and examples have been taken at Weymouth, Dorset.

46. Andrena polita.

A. nigra, fulvo-pilosa; thorace rufescenti-piloso; tibiis tarsisque posticis, atque abdominis apice fulvis.

Andrena polita, *Smith, Zool.* v. 1733. 11 ♂ ♀.

Female. Length 5½ lines.—Black; the face thinly clothed with fulvous pubescence, the flagellum fulvo-piceous beneath. Tho-

rax: the disk thinly clothed with rufo-fulvous pubescence, on the metathorax and sides it is paler; the wings subhyaline, their apical margins clouded, the tegulæ rufo-testaceous; the pubescence on the legs fulvous, the scopa bright fulvous, the floccus pale fulvous; the tarsi ferruginous. Abdomen shining, oblong-ovate, closely and delicately punctured, the apical margins of the segments obscurely rufo-testaceous; the second, third and fourth segments having a narrow pale fulvous fringe, more or less obliterated in the middle; the fifth and apical segments clothed with bright fulvous pubescence. B.M.

Male. Length 5 lines.—The pubescence on the clypeus white, above which it is pale fulvous, the cheeks have a long beard and the mandibles a fringe of very pale pubescence, the femora have a fringe of the same colour; on the tibiæ and tarsi it is pale fulvous, the apical joints of the latter being pale ferruginous; on the disk of the thorax the pubescence is fulvo-ochraceous, the wings as in the female. Abdomen oblong-ovate, very glossy, its pubescence as in the female; the margins of the segments depressed and narrowly rufo-testaceous.

This beautiful species was discovered in the chalk pits at Northfleet some years ago, in the month of July, where it has since been met with, but not in any other locality; it appears to be a rare insect.

47. Andrena fulvago.

A. nigra, fulvo-villosa; thorace pube rufa; abdomine punctulato, nitido; pedibus posticis, anoque, fulvis.

Apis fulvago, *Christ. Hym.* p. 189. t. 16. f. 7 ♀.
Melitta fulvago, *Kirby, Mon. Ap. Angl.* ii. 93. 44.
Andrena fulvago, *St. Farg. Hym.* ii. 243. 11.
Smith, Zool. v. 1732. 9 ♂ ♀.
Nyland. Ap. Boreal. p. 99; *Revis. Ap. Boreal.* p. 255. 19.

Female. Length 4½ lines.—Black; the face thinly clothed with short fulvous pubescence, the clypeus strongly punctured; the flagellum fulvo-testaceous beneath. Thorax: the disk shining, strongly punctured, thinly covered with obscure rufous pubescence; wings fulvo-hyaline, the nervures ferruginous, tegulæ rufo-piceous; the legs rufo-piceous, the tarsi and posterior tibiæ rufo-fulvous; the floccus pale fulvous, the scopa fulvous. Abdomen subovate, shining, and finely punctured; the apical margins of the segments depressed and obscurely rufo-piceous;

the apical fimbria fulvous; the apical margins of the third and fourth segments have sometimes a thin fulvous fringe. B.M.

Male. Length 4 lines.—The head and thorax have an obscure rufo-fulvous pubescence; the antennæ shorter than the thorax, dark rufo-testaceous beneath; wings as in the female; the intermediate tarsi and the posterior tibiæ and tarsi, rufo-fulvous; the claws of the anterior tarsi fulvous. Abdomen oblong-ovate, punctured, the margins obscurely rufo-piceous, the three apical segments having a thin fringe of pale fulvous pubescence. B.M.

This is a very local insect; it appears about the beginning of June; in some places it is not uncommon. It has been observed entering its burrows in a bank of light earth at Hawley in Hampshire, and also occurs at Weybridge. It frequents a species of Hawkweed (*Hieracium*), in which the males are frequently to be found reposing.

48. Andrena fulvescens.

A. nigra, fulvo-villosa; tibiis tarsisque posticis fulvis; abdomine apice fulvo.

Andrena fulvescens, *Smith, Zool.* v. 1732. 10.

Female. Length 5 lines.—Black; the face clothed with fulvous pubescence, the flagellum fulvo-piceous beneath. Thorax clothed with fulvous pubescence; the wings subhyaline, and having a fulvous tinge, the nervures fulvo-testaceous; the floccus, scopa, and the pubescence on the legs and apex of the abdomen bright fulvous; the posterior tibiæ and tarsi rufo-fulvous, the claws of the same colour; the abdomen ovate, smooth and shining. B.M.

Male. Length 4½–5 lines.—The clypeus yellowish-white, having two minute black dots, and covered with white pubescence; on the vertex and on the thorax it is ochraceous; wings as in the female; the legs have a griseous pubescence. Abdomen thinly sprinkled with pale ochraceous pubescence, the apex ferruginous. B.M.

Hampstead Heath is the only spot near London where this bee occurs; it burrows in the hard gravel pathways to the south of the pond in the Vale of Health; it appears in the beginning of June, but is not very abundant. In a similar pathway leading to Hawley Green, Hampshire, is a large colony of this species; so numerous, that their flight, as they skim over the surface

of the ground, produces a loud humming noise; during the last ten years, as in 1843, the same colony has continued equally numerous. Like the former species this insect frequents the flowers of a species of Hawkweed.

B. *The apical margins of the segments having white fasciæ.*

49. Andrena longipes.

A. atra, pallido-villosa; thorace fulvo; tarsis omnibus rufis; abdomine ovato, fasciis tribus interruptis albis.

Andrena longipes, *Smith, Zool.* v. 1740. 24 ♂ ♀.
Andrena bucephala, *Steph. Illust. Mand.* vii. *Supp.* p. 17. ♂ var. t. 43. f. 6.

Female. Length 5–6 lines.—Black; the face thinly clothed with pale fulvous pubescence, below the insertion of the antennæ it is somewhat griseous; antennæ slender, more than half the length of the thorax; the flagellum piceous beneath. Thorax: above, clothed with fulvous pubescence, paler on the metathorax and sides; the wings fulvo-hyaline, the nervures and tegulæ pale rufo-testaceous; the legs have a thin fulvous pubescence; the floccus white, the scopa and the pubescence on the tarsi of a golden-fulvous, very bright and glittering; the tarsi rufo-fulvous, the posterior tarsi usually of the same colour, but sometimes fusco-ferruginous; the legs more elongate than usual. Abdomen ovate, shining and convex; the apical margins of the second, third and fourth segments, have a very narrow white marginal fringe, the two first interrupted; the apical fimbria fulvous. B.M.

Male. Length 4–6 lines.—The head varying in size, sometimes twice as large as the thorax, the mandibles forcipate; the face has a thinly scattered pale fulvous pubescence; the clypeus shining and finely punctured; the antennæ as long as the thorax. The thorax and wings as in the female; the tarsi and extreme apex of the tibiæ fulvo-ferruginous; the legs elongate as in the other sex. Abdomen lanceolate, much narrowed at the base, naked and shining, the margins of the segments obscurely rufo-piceous. B.M.

This very conspicuous and beautiful species is found in plenty on a mound close to Highgate Archway, and occurs occasionally on Hampstead Heath; it has also been met with on the border of Hawley-Flat, Hants: these are the only localities

known. It appears in the month of April; the large-headed males have a very ferocious aspect.

50. Andrena albicrus.

A. atra, cinereo-villosa; thorace fulvo; abdomine ovato, pilosulo, strigis tribus albis; scopa versicolori.

Melitta albicrus, *Kirby, Mon. Ap. Angl.* ii. 156. 96 ♂ ♀.
Melitta barbilabris, *Kirby, Mon. Ap. Angl.* ii. 151. 91 ♂ var.
Andrena albicrus, *Smith, Zool.* v. 1924. 59.

Female. Length 5–5½ lines.—Black; the face on each side and the vertex have a little pale fulvous pubescence, the channel on each side of the face covered with a fulvous pile; the flagellum nigro-piceous beneath. Thorax: the disk thinly clothed with fulvous pubescence, on the metathorax and sides it is paler; the wings subhyaline, the nervures and tegulæ rufo-piceous; the legs have a cinereous pubescence; the scopa fuscous above and silvery-white beneath; the floccus white. Abdomen ovate, smooth and shining, the second, third and fourth segments have a narrow white marginal fringe, the two first usually interrupted; the apical fimbria fuscous; beneath, the margins of the apical segments have a narrow white fringe, the segments having some longer scattered silvery pubescence. B.M.

Male. Length 4–5 lines.—Black; having a long hoary pubescence on the head, thorax and legs; that on the disk of the thorax tinged with ochraceous, that on the clypeus being snow-white and glittering, forming a beard, which hides the labrum. Abdomen ovate-lanceolate, having a thinly scattered cinereous pubescence; the margins of the segments depressed, a little pale glittering pubescence at the apex. B.M.

This species appears about the middle of May, and forms large colonies. I have frequently observed the sexes *in coitu*. The species is generally distributed, and is very plentiful on Hampstead Heath; it is also very numerous about Charlton, Blackheath, &c. It has been taken in Yorkshire in the month of July; at the sides of a sandy road on the top of Woolley Edge near Wakefield are immense colonies; there it swarms in countless numbers; they occur in every flower of a species of Hawkweed, with which the sides of the lane are bordered.

51. Andrena labialis.

A. nigra, pallide villosa; thorace fulvescenti; pedibus fulvo-villosis; abdominis segmentis intermediis utrinque striga alba. *Mas,* facie albida.

Melitta labialis, *Kirby, Mon. Ap. Angl.* ii. 148. 87 ♂.
Andrena labialis, *Smith, Zool.* v. 1921. ♂ ♀.
Nyland. Revis. Ap. Boreal. p. 256. 23.
Andrena separata, *Smith, Zool.* v. 1922. 55 (var. ♀?).

Female. Length 5½–6 lines.—Black; the face has a pale fulvous pubescence, the clypeus naked and strongly punctured. Thorax strongly punctured, thinly clothed with short fulvous pubescence, at the sides and on the metathorax it is more dense and of a paler colour; the tegulæ pale testaceous; the wings fulvo-hyaline, their nervures ferruginous, faintly clouded at their apical margins; the legs have a short fulvous pubescence; the apical joints of the tarsi ferruginous; the scopa fulvous, the floccus pale fulvous. Abdomen ovate, shining, finely and closely punctured; the three intermediate segments have a narrow fringe of pale fulvous pubescence, the first two usually interrupted, the apical fimbria fulvous. B.M.

Male. Length 5–6 lines.—Black; the clypeus and the face on each side pale yellow, the former having a minute angular dot on each side; the face has a pale fulvous pubescence, on the disk of the thorax it is fulvous, paler on the sides and on the legs; wings as in the female. Abdomen ovate-lanceolate, punctured as in the other sex, and having a pale fulvous fringe on the apical margins of the segments, frequently obliterated on the first, and usually interrupted on the two following; the extreme apex fulvous. B.M.

This bee usually appears about the end of May; it is not uncommon to the north of London, about Hampstead and Highgate, but I believe it to be local: I have not yet seen it from the north of England. The bright colouring which this species exhibits when first disclosed soon fades, and this cannot be too much impressed on the mind in studying these descriptions.

It is very probable that *A. separata* is only a variety of the female, notwithstanding its having a white clypeus; it occurs in company with the other, but very rarely.

52. Andrena chrysosceles.

A. nigra, cinereo-subpubescens; abdomine nitido, fasciis interruptis albis; ano, tarsis, tibiisque posticis, testaceis. *Mas*, facie antice albida.

Melitta chrysosceles, *Kirby, Mon Ap. Angl.* ii. 143. 82.
Andrena chrysosceles, *Smith, Zool.* v. 1917. 17.
Nyland. Ap. Boreal. p. 218. 15; *Revis. Ap. Boreal.* p. 257. 26.

Female. Length 4–4½ lines.—Black; the face has a short glittering whitish pubescence, the channels on each side of the face covered with a fulvous pile, the apex of the flagellum fulvo-piceous beneath. Thorax: the disk has a very thin pale fulvous pubescence, and on each side over the tegulæ an abbreviated impressed line; the wings fulvo-hyaline, iridescent, the nervures and tegulæ pale rufo-testaceous; legs nigro-piceous, and having a pale pubescence; the tarsi and the posterior tibiæ fulvo-testaceous; the floccus and fringe of the femora white, the scopa of a pale golden yellow, very bright and glittering. Abdomen subovate, subdepressed, shining and very delicately punctured; the apical margins of the three intermediate segments have a very narrow white marginal fringe, the first two usually interrupted; the apical fimbria bright fulvous. B.M.

Male. Length 3½–4 lines.—Head rather wider than the thorax, the clypeus pale yellow, and having on each side a minute black dot; the pubescence on the clypeus silvery-white, above and on the vertex very pale fulvous, it is of the same colour on the disk of the thorax; wings and legs as in the other sex, the posterior tibiæ fuscous and pale at the apex. Abdomen lanceolate, shining and delicately punctured, the margins of the segments obscurely rufo-piceous, the intermediate ones having laterally a short fringe of white pubescence, the apex pale testaceous. B.M.

This species usually appears in June; it is widely distributed, but is still a local insect; it occurs in many places in the London district, and is frequently taken on *Umbelliferæ* at wood sides, &c.; it is a very distinct species and easily recognized.

53. Andrena Coitana.

A. atra, glabriuscula; abdomine nitidissimo, subcuneiformi, segmentis intermediis utrinque albo ciliatis; scopa versicolori. *Mas*, frontis angulis, clypeoque albis.

Melitta Coitana, *Kirby, Mon. Ap. Angl.* ii. 147. 86 ♂.
Melitta Shawella, *Kirby, Mon. Ap. Angl.* ii. 160. 100 ♀.
Andrena Coitana, *Smith, Zool.* v. 1919. ♂ ♀ var.
Andrena Shawella, *Smith, Zool.* v. 1926. 64.
Andrena nana, *Nyland. Ap. Boreal.* p. 221. 19 ♂ ♀.

Female. Length 4 lines.—Black; the face nearly naked, having only a few scattered griseous hairs; the lateral channels of the face, which in this species are continued as high as the vertex of the eyes, are slightly curved inwards towards the stemmata, and are clothed with fuscous pile. Thorax shining, and having a few pale hairs at the sides of the metathorax; the disk rather strongly punctured and shining, the metathorax opaque; the tegulæ piceous, the wings subhyaline, the nervures fuscous; the first recurrent nervure received near the apex of the second submarginal cell; the floccus white, the scopa fuscous above, silvery beneath. Abdomen glossy, widest towards the apex, the margins of the intermediate segments slightly depressed, and having a narrow fringe of short white pubescence, the first two widely interrupted, the apical fimbria rufo-fuscous. B.M.

Male.—The clypeus and a small angular spot on each side white, the clypeus having two minute black dots: the antennæ shorter than the thorax, the latter shining, and having a very thin pale ochraceous pubescence: wings as in the other sex; the legs have a cinereous pubescence, and the apical joints of the tarsi are ferruginous. Abdomen lanceolate, and having a scattered griseous pubescence, that at the apex pale and glittering. B.M.

This species is not met with in the London district, but in the north of England it does not appear to be uncommon. It is frequently received from Scotland; in 1852 both sexes were taken in tolerable plenty, and dug out of the same burrows: this circumstance, in connexion with the fact of both insects being usually received at the same time from Scotland, removes any hesitation in considering them one species. A specimen or two has occurred at Weybridge.

54. Andrena analis.

A. nigra, cinerascenti-villosa; abdomine nitido, fasciis interruptis albidis; tarsis tibiisque posticis fulvis.

Andrena analis, *Panz. Faun. Germ.* 90. 14 ♂, 15 ♀.
Smith, Zool. v. 1920. 53.
Andrena tarsata, *Nyland. Ap. Boreal.* p. 223. 22 ♂?; *Revis. Ap. Boreal.* p. 259. 32 ♂.

Female. Length 4 lines.—Black; the face thinly clothed with griseous pubescence, but having a slight fulvous stain on the margin of the clypeus; the flagellum fulvo-piceous towards the apex beneath. Thorax: the pubescence sparing and griseous on the disk, but dense and white at the sides of the metathorax; wings subhyaline, iridescent, the nervures ferruginous; the floccus white, the scopa bright fulvous, the posterior tibiæ and tarsi, and the apical joints of the anterior and posterior tarsi, rufo-fulvous. Abdomen shining, ovate, and having a short white marginal fringe on the apical margins of the segments, that on the first frequently obliterated, and those on the second and third usually widely interrupted; the apical fimbria fuscous. B.M.

Male. Length 3½ lines.—The clypeus white and having three minute fuscous dots placed in a triangle, the anterior dot sometimes nearly obsolete, densely covered with long white pubescence: along the margins of the eyes and at the insertion of the antennæ a little mixture of fuscous pubescence. Thorax shining, and having a thin griseous pubescence, mixed with fuscous hairs at the margin of the scutellum; wings subhyaline, iridescent, the nervures testaceous; the tarsi ferruginous. Abdomen lanceolate, shining and delicately punctured, the margins of the intermediate segments depressed, smooth and shining, sometimes having a loose fringe of pale pubescence; the extreme apex ferruginous. B.M.

In this species the first recurrent nervure is received in the middle of the second submarginal cell.

This species does not occur near London; it has once or twice been taken at Weybridge. Mr. J. Hardy took both sexes from the nest; he finds it abundantly in little hillocks, at the sides of pathways, in Penmanshiel Wood, Berwickshire. It has also been received from Ireland.

55. Andrena minutula.

A. atra, glabriuscula; cinereo-subvillosa; abdomine nitido, subrotundo; tibiarum posticarum scopa argentea.

Melitta minutula, *Kirby*, *Mon. Ap. Angl.* ii. 161. 101 ♂ ♀.
Melitta parvula, *Kirby*, *Mon. Ap. Angl.* ii. 162. 103 (var.).
Andrena minutula, *Smith*, *Zool.* v. 1925. 61.
Andrena parvula, *Smith*, *Zool.* v. 1925. 63.
Nyland. Revis. Ap. Boreal. p. 258. 29.
Andrena subopaca, *Nyland. Ap. Boreal.* p. 221. 19.

Female. Length 3–3½ lines.—Black; the face has on each side a line of silvery pubescence, which extends to the vertex of the eyes, the clypeus is also sprinkled with a few glittering hairs; the flagellum is usually rufo-piceous beneath. Thorax thinly sprinkled with pale pubescence, most dense at the sides of the metathorax, which is rounded posteriorly and finely rugose; wings slightly fuscous, the nervures ferruginous; the legs have a glittering hoary pubescence, the floccus white, the scopa silvery and glittering: the tarsi beneath fulvous, the calcaria pale testaceous. Abdomen subovate, shining, the apical fimbria fusco-cinereous; the margins of the segments beneath ciliated with glittering hairs. B.M.

Male. Length 2½–3 lines.—The entire pubescence cinereous, that on the clypeus very bright and glittering; the flagellum rufo-piceous beneath; the wings subhyaline, splendidly iridescent; the legs have a beautiful glittering pubescence, the calcaria pale testaceous, the apical joints of the tarsi rufo-testaceous. Abdomen subovate, convex, smooth and shining. B.M.

Var. *α*. The legs rufo-testaceous.

Var. *β*. The posterior tarsi entirely testaceous.

This little bee usually appears in May, when the Germander Speedwell (*Veronica Chamædrys*) is in flower, to which I have observed it to be partial. For some years past males and females have been taken on the above flowers on a bank at the side of Bishop's Wood, Hampstead. Mr. Kirby says, that the male of *M. parvula* has black hair on its face; this is certainly an error. He does not say why he placed them together. After the most careful examination of the typical specimens described by Kirby, no difference can be found between *A. parvula* and *A. minutula*. In the Kirbyan Cabinet are specimens of *A. nana* placed as varieties of *A. minutula*.

The antennæ of *A. minutula*, female, are frequently more or less rufo-piceous towards the apex; and specimens occur whose legs

and abdomen are testaceous. It thus becomes a matter of great doubt whether the two can possibly be distinct.

56. Andrena nana.

A. atra, albido-villosula; abdomine nitido, segmentis basi punctulatissimis; tibiarum posticarum scopa argentea.

Melitta nana, *Kirby, Mon. Ap. Angl.* ii. 161. 102 ♀.
Andrena nana, *Smith, Zool.* v. 1925. 62.
Nyland. Revis. Ap. Boreal. p. 258. 30.

Female. Length 3½ lines.—Black; on each side of the face a line of silvery pile along the margins of the eyes. Thorax: a little cinereous pubescence on the metathorax and at the sides, that on the legs is of the same colour; the tegulæ piceous, the wings subhyaline, the nervures ferruginous; the posterior legs have the floccus white, the scopa silvery, bright and glittering; the basal joint of the tarsi slightly fulvous within; the apical joints of the tarsi ferruginous. Abdomen elongate-ovate, shining and delicately punctured; the apical margins of the segments depressed, and impunctate; on the apical margins of the three intermediate segments laterally, a fringe of white pubescence; the apical fimbria white, with more or less of a fulvous tinge; beneath, the margins of the segments thinly ciliated with white hairs. B.M.

This little bee is very liable to be confounded either with *A. parvula* or more probably with the *A. Coitana*, which indeed it much resembles; it will be known at once from the former by the form of its abdomen, and from the latter by its silvery scopa, and by its thorax being much more finely punctured. The male given by Kirby belongs to *A. minutula*, but whether the black-faced male assigned to *A. parvula* belongs to *A. nana* is not quite certain, another name therefore is given to it provisionally. This is not a common species, although widely distributed; it is met with in Yorkshire, and occasionally in the London district in June and July.

57. Andrena nigrifrons.

A. atra, cinereo-subvillosa; facie atro-villosula.

Melitta nana, *Kirby, Mon. Ap. Angl.* ii. 161. 102 ♂.

Male.—Black; the face clothed with black pubescence, the mandibles ferruginous at their apex, the flagellum nigro-piceous

beneath; the wings subhyaline, splendidly iridescent; the legs have a hoary pubescence; the claws ferruginous. Abdomen subovate, the apex testaceous. B.M.

This may prove to be the male of *A. nana*; it cannot possibly belong to *A. parvula*, as supposed by Kirby.

58. Andrena argentata.

A. atra, argenteo-villosa; thorace pallide fulvo; abdomine ovato, fasciis tribus albis, in medio vix interruptis.

Andrena argentata, *Smith, Zool.* ii. 409; v. 1920. 52.
Nyland. Revis. Ap. Boreal. p. 256. 22.
Andrena barbatula, *Zett. Ins. Lapp.* p. 461. 5?

Female. Length 4 lines.—Head: a line of silvery pile on each side of the face; the face, above the antennæ, delicately longitudinally striate; the antennæ nigro-piceous beneath, the tips covered with silvery-white pubescence. Thorax thinly clothed with pale fulvous pubescence, on the sides of the metathorax and beneath it is cinereous; the legs have a glittering silvery pubescence; the apical joints of the tarsi ferruginous. Abdomen ovate, shining and very delicately punctured; the apical margins of the three intermediate segments fringed with white pubescence, the first usually interrupted; the apical fimbria fuscous, intermixed with glittering silvery hairs. B.M.

Male. Length 3 lines.—The pubescence silvery-white, thinly scattered on the disk of the thorax, the tegulæ fulvo-testaceous, wings hyaline, splendidly iridescent; the apical joints of the tarsi pale rufo-testaceous. Abdomen very glossy and smooth, the basal segment has on each side a short fringe of snow-white pubescence, on the four following the fringe is slightly interrupted.

This pretty little species was discovered some years ago at Sandhurst, Berks; subsequently at Weybridge, in the beginning of August: no other locality is known. The *A. barbatula* of Zetterstedt may be synonymous, but certainly not *A. barbatula* of Kirby.

59. Andrena dorsata.

A. cinereo-subvillosa; thorace fulvo; metathorace utrinque

fimbria pallida; abdomine fasciis tribus albis, antica interrupta.

Melitta dorsata, *Kirby, Mon. Ap. Angl.* ii. 144. 83 ♀.
Melitta combinata, *Kirby, Mon. Ap. Angl.* ii. 153. 94.
Melitta nudiuscula, *Kirby, Mon. Ap. Angl.* ii. 155. 95.
Andrena dorsata, *Smith, Zool.* v. 1918. 48.
Andrena combinata, *Smith, Zool.* v. 1923. 58.

Female. Length 4½ lines.—Black; the face has a cinereous pubescence, and on each side a line of fulvous pile as high as the vertex of the eyes; the flagellum sometimes rufo-testaceous towards the apex beneath. Thorax clothed with short fulvous pubescence, thinly scattered on the disk, but dense on the scutellum: the sides of the metathorax have a thick curled fringe of pale pubescence; the tegulæ ferruginous, the wings subhyaline, the nervures pale ferruginous; the legs rufo-testaceous, the femora and tibiæ sometimes fusco-testaceous; the floccus white; the scopa pale fulvous, intermixed with glittering hairs; the basal joint of the tarsi fulvous beneath. Abdomen subovate, very glossy and delicately punctured; the three intermediate segments have a narrow white fringe on their apical margins; the first usually interrupted; the apical fimbria fulvous; beneath, the margins of the segments have a long fringe of pale pubescence. B.M.

Male. Length 4 lines.—The clypeus and cheeks have a long, dense, cinereous pubescence, on the margin of the vertex and disk of the thorax it is pale fulvous, most dense on the scutellum; the sides of the metathorax have a long cinereous pubescence; the tarsi ferruginous, much lighter in some specimens than in others; the wings splendidly iridescent. Abdomen ovate-lanceolate, smooth and shining, the margins of the intermediate segments have a very narrow white fringe on their apical margins, which is usually interrupted. B.M.

Amongst a series of specimens of *A. dorsata*, the differences pointed out by Kirby as distinctive of *A. dorsata*, *A. combinata* and *A. nudiuscula* gradually present themselves; thus, the obscure posterior tibiæ, pale only at the apex, the tegulæ a little darker than in *A. combinata*, and the pubescence a little bleached, from ferruginous to fulvous, typify the *M. dorsata*; the variety having the thorax clothed with ferruginous pubescence, and having the legs paler, constitutes the *M. combinata*; and as to the *M. nudiuscula*, no hesitation can be felt, after careful examination, in considering it a worn specimen of *A. dorsata*; at least this is the conclusion at which I have arrived, after a careful examination of the typical examples in the Kirbian collection.

This species, although plentiful in some localities, does not occur near London: it appears in July and August, at Weybridge.

60. Andrena connectens.

A. atra, cinereo-subpubescens; thorace fulvo; abdomine convexo, nitido; pedibus rufis.

Melitta connectens, *Kirby, Mon. Ap. Angl.* ii. 157. 97.
Andrena connectens, *Smith, Zool.* v. 1924. 60.

Female. Length 5 lines. — Black; at the insertion of the antennæ and sides of the face a long pale fulvous pubescence, very sparing on the clypeus, which is shining and coarsely punctured; the flagellum fulvous beneath. Thorax: the pubescence on the disk fulvous, most dense on the scutellum; at the sides of the metathorax a dense fringe of pale pubescence, the disk shining and strongly punctured; the wings subhyaline, having a fulvous tinge, the nervures and tegulæ pale testaceous; the legs rufo-testaceous, and having a pale glittering pubescence, the floccus white, the scopa silvery. Abdomen subovate, shining and delicately punctured; the margins of the segments obscurely rufo-testaceous; the three intermediate segments have a marginal fringe of yellowish-white pubescence, that on the first usually interrupted; the apical fimbria pale and glittering, having a fulvous tinge; beneath, the segments have a long pale marginal fringe. B.M.

It will be seen that this insect closely approaches the preceding, but it is certainly more than a variety; the principal points in which it differs are, the coarsely sculptured clypeus, and the strongly punctured thorax; the colour of its legs also, taken in combination with the above differences, furnishes a good specific distinction.

This species has been met with at Southend in the month of August.

61. Andrena fuscata.

A. nigra, pallide subvillosa; thorace fusco; abdomine ovato, convexiusculo, segmentorum marginibus albo-fasciatis.

Melitta fuscata, *Kirby, Mon. Ap. Angl.* ii. 167. 107 ♀.
Andrena fuscata, *Smith, Zool.* v. 1929. 68 ♂ ♀.

Female. Length 4½ lines.—Black; the pubescence on the face short and pale fulvous; the flagellum nigro-piceous towards

the apex. Thorax shining and finely punctured; the metathorax opake; the pubescence on the middle of the disk fuscous, at the sides it is pale fulvous, as well as on the metathorax laterally; the wings hyaline, faintly clouded at their apical margins, the nervures fusco-ferruginous; the legs have a pale pubescence, the floccus nearly white, having an ochraceous tinge, the scopa of a glittering pale fulvous. Abdomen shining, subovate and convex, very delicately and closely punctured; the apical margin of the basal segment has on each side a short fringe of pale ochraceous pubescence, the following have a marginal fringe of the same colour, the first usually interrupted; the apical fimbria rufo-fuscous.

This insect so closely resembles the following in every particular, except the colour of the posterior legs, that great hesitation arises in separating them. *A. Afzeliella* abounds on Hampstead Heath, where it burrows in the sandy spots; the present species is occasionally found in its company.

62. Andrena Afzeliella.

A. atra, pallide fulvo-villosa; thorace fusco-ferrugineo; abdomine subcordato, fasciis tribus pallidis, anticis interruptis.

Melitta Afzeliella, *Kirby, Mon. Ap. Angl.* ii. 169. 108.
Melitta contigua, *Kirby, Mon. Ap. Angl.* ii. 140. 79 ♂.
Andrena Afzeliella, *Smith, Zool.* v. 1929. 69.

Female. Length 4½–5 lines.—Black; the face has a pale fulvous pubescence, the clypeus naked, the flagellum nigro-piceous towards the apex. Thorax shining and punctured; the disk has a dark ferruginous pubescence, on the sides it is of a pale fulvous; the wings hyaline, their apical margins faintly clouded; the legs have a pale fulvous pubescence, the posterior tibiæ and tarsi rufo-fulvous, the apical joints of the anterior and intermediate tarsi ferruginous. Abdomen ovate, sometimes heart-shaped, shining and very delicately and closely punctured; the apical margin of the basal segment has on each side a short fringe of white pubescence; the three following segments have a fringe of the same colour, the first interrupted; the apical fimbria rufo-fuscous. B.M.

Male. Length 3½–4 lines.—The face has a long thin fulvous pubescence, that on the thorax is of the same colour, beneath and on the legs it is paler; the antennæ shorter than the thorax, the flagellum slightly piceous at the apex; the wings as in the female. Abdomen ovate-lanceolate, very acute at the apex;

shining, closely and more strongly punctured than in the female; the margins of the segments depressed, the segments having a marginal fringe of pale pubescence, sometimes white; the apex covered with white pubescence.

This is a very abundant species in all parts of the country: it appears in April. And here may be recorded an observation made during each succeeding autumn for several years past:—This species partially reappears in the month of August, when fine fresh males may be captured, and in a few days afterwards the females; this reappearance however is only partial. In very fine long-continued hot weather in autumn, *Anthophora acervorum*, *Melecta armata*, and *Nomada Marshamella* have been taken, all being early spring insects: such occurrences are however very rare, and no one has previously recorded such appearances.

63. Andrena convexiuscula.

A. nigra, griseo-subpubescens; abdomine ovato, convexo, segmentorum marginibus pallidis; tibiis plantisque posticis rufis.

Melitta convexiuscula, *Kirby, Mon. Ap. Angl.* ii. 166. 106 ♀.
Andrena convexiuscula, *Smith, Zool.* v. 1927. 66 ♂ ♀.
Nyland. Revis. Ap. Boreal. p. 257. 25.
Andrena xanthura, *Nyland. Ap. Boreal. Supp.* p. 100.

Female. Length 5 lines.—Black; the face covered with short pale fulvous pubescence, the flagellum slightly testaceous near the apex. Thorax very closely punctured and thinly clothed above with fulvous pubescence, on the metathorax and sides it is paler; the tegulæ piceous, the wings subhyaline, faintly obscured towards their apical margins, the nervures rufo-testaceous; the intermediate and posterior tarsi, the apical joints of the anterior pair and the posterior tibiæ pale rufous, the latter having a fuscous stain beneath; the floccus white, the scopa of a golden-yellow, having in certain lights a glittering silvery brightness. Abdomen ovate, convex, and shining, very delicately and finely punctured, the punctures faintly impressed; the three intermediate segments have on their apical margins a narrow fringe of pale yellow pubescence; the two apical segments have a scattered short rufous pilosity, the apical fimbria is pale fulvous. B.M.

Male.—The face clothed with griseous pubescence, the clypeus strongly punctured, the antennæ nearly as long as the thorax,

the extreme apex testaceous, the joints subarcuate. Thorax: the pubescence griseous, that on the disk has a slight fulvous tinge; the legs covered with pale glittering pubescence, that on the tarsi beneath golden-yellow; the apical joints of the anterior and intermediate tarsi, the posterior pair, and the extreme apex of the tibiæ, rufo-testaceous; the wings as in the female. Abdomen ovate-lanceolate, punctured and fringed as in the female. B.M.

This bee is not met with in the London district; it is taken near Farnham in Surrey, and in the Isle of Wight. Mr. Dale records that it is occasionally plentiful at Glanvilles Wootton; it must be widely distributed, having frequently been received from distant localities. This species appears to be always attacked by some species of *Stylops*: out of upwards of thirty specimens examined, not one of either sex is free; some individuals having one, others two, and a few even three specimens of *Stylops* projecting from the segments of the abdomen.

64. Andrena Kirbyi.

A. nigra, pallide villosa; thorace nitido; abdominis segmentis pallido-marginatis.

Andrena Kirbyi, *Curtis, Brit. Ent.* iii. 129. t. 129.
Smith, Zool. v. 1922. 56.

Female. Length 6 lines.—Black; the head very closely punctured, rendering it opake, the pubescence ochraceous; the clypeus strongly punctured; the flagellum beneath, except the two basal joints, fulvous. Thorax: the disk shining, strongly but not very closely punctured, thinly covered with short ochraceous pubescence; the wings fulvo-hyaline, the nervures and tegulæ pale testaceous; the legs dark rufo-piceous, the floccus pale ochraceous, and having a silvery brightness beneath; the apical joints of the tarsi pale ferruginous. Abdomen subcordate, slightly depressed, very finely and closely punctured; the base pubescent, the apical margin of the first and three following segments having a fascia of short ochraceous pubescence, the apical fimbria rufo-fuscous: beneath strongly punctured, the margins of the segments rufo-testaceous, the three apical ones ciliated with long pale hairs. B.M.

The only British specimen of this insect known is in the British Museum; it was formerly in the cabinet of the late Mr. Stephens; there is an excellent figure of it in Mr. Curtis's

'British Entomology.' It is strange that no second specimen should have been met with, as these insects are usually distributed in different localities, although some are much less abundant than others. A species very closely resembling it is described in the 'Catalogue of Andrenidæ,' published by the Trustees of the British Museum; it is from Albania, and varies much in its colouring, whence its name, *A. variabilis*.

65. Andrena Collinsonana.

A. atra, cinereo-subpubescens; thorace pallide villoso; abdomine utrinque strigis tribus albis; scopa pallide argenteo-nitida, supra subfusca.

Melitta Collinsonana, *Kirby*, *Mon. Ap. Angl.* ii. 153. 93 ♂.
Melitta proxima, *Kirby*, *Mon. Ap. Angl.* ii. 146. 95 ♀.
Melitta digitalis, *Kirby*, *Mon. Ap. Angl.* ii. 159. 99 ♀ var.
Andrena proxima, *Smith*, *Zool.* v. 1918. 50.

Female. Length 4½ lines.—Black; the face below the antennæ densely clothed with short cinereous pubescence; on the vertex and disk of the thorax it is somewhat ochraceous; the antennæ half the length of the thorax; the thorax coarsely punctured on the disk; the sides of the metathorax thickly fringed with pale pubescence; the wings subhyaline, having a fulvous tinge towards their apex, the nervures ferruginous; the floccus white; the legs have a silvery pubescence, the scopa of a silvery brightness, tinged with yellow above; the basal joint of the posterior tarsi sometimes fuscous towards the apex within; the apical joints of the tarsi ferruginous. Abdomen subovate, shining and convex; the apical margins of the intermediate segments have a lateral white fringe, the apical fimbria is bright golden-yellow, slightly fuscous. B.M.

Male. Length 3½ lines.—The face has a cinereous pubescence, the head wider than the thorax, the antennæ nearly as long; the pubescence on the thorax and legs cinereous, faintly tinged with ochraceous on the disk of the former, the wings as in the other sex; the basal joint of the tarsi has a golden pubescence within, their apical joints pale rufo-testaceous. Abdomen ovate-lanceolate, shining, and fringed as in the female; at the apex some bright glittering yellow pubescence; beneath, the three apical segments are fringed with bright golden-yellow pubescence. B.M.

This species is not found in the London district; it occurs at Weybridge, at Bristol, and in Hampshire. An examination of a

series of specimens enables us satisfactorily to determine the range of variation to which the species is liable; thus, the basal joint of the posterior tarsi is sometimes entirely golden-yellow within, but at other times it is fuscous towards the apex; the latter variety is the *M. digitalis* of Kirby. The sexes have a strong general resemblance; their abdomen is of a deeper black than is usual in the *Andrenidæ*.

66. Andrena Lewinella.

A. nigra, pallide villosa; thorace tarsisque rufescentibus; abdominis segmentis intermediis utrinque albo-strigatis.

Melitta Lewinella, *Kirby, Mon. Ap. Angl.* ii. 149. 88 ♂.
Andrena Lewinella, *Smith, Zool.* v. 1923. 58.

Male. Length 3¾ lines.—Black; the face clothed with pale fulvous pubescence, the antennæ nearly as long as the thorax. Thorax: the disk clothed with dark rufous pubescence; the wings subhyaline, faintly clouded at their apical margins, the nervures testaceous; the legs have a griseous pubescence, the tarsi, and posterior tibiæ at their apex, rufo-testaceous. Abdomen fuscous, ovate-lanceolate, at the base a little pale pubescence, the intermediate segments have on each side a white marginal fringe, at the apex a little pale pubescence. B.M.

A specimen of this species was captured in Sussex by Mr. S. Stevens; its female is not known; *A. Lewinella* is very like the male of *A. denticulata*.

67. Andrena Wilkella.

A. atra, subvillosa; abdominis segmentis intermediis utrinque albo-marginatis.

Melitta Wilkella, *Kirby, Mon. Ap. Angl.* ii. 145. 84 ♀.
Andrena Wilkella, *Smith, Zool.* v. 1918. 49.

Female. Length 5¾ lines.—Black; the face has on each side a little pale fulvous pubescence, the flagellum is rufo-piceous beneath. Thorax shining, thinly clothed with pale fulvous pubescence; the wings fulvo-hyaline, the nervures testaceous; the legs have a pale fulvous pubescence, that on the femora griseous; the posterior tibiæ and the basal joint of the tarsi pale rufous, the tarsi ferruginous; the floccus pale yellowish-white, the scopa pale fulvous, the tarsi fulvous beneath. Abdomen oblong-ovate, impunctate, the apical margins of the interme-

diate segments have a white marginal fringe on each side, the apical fimbria pale fulvous. B.M.

This species closely approaches *A. chrysosceles*, but it is larger, and its abdomen is not punctured.

68. Andrena xanthura.

A. atra, pallide villosa; ano, tibiis plantisque posticis rufescentibus; abdomine fasciis albidis interruptis.

Melitta xanthura, *Kirby, Mon. Ap. Angl.* ii. 164. 105 ♂ ♀.
Melitta ovatula, *Kirby, Mon. Ap. Angl.* ii. 149. 89 ♂ var.
Andrena xanthura, *Smith, Zool.* v. 1928. 67.
Nyland. Revis. Ap. Boreal. p. 257. 24.
Andrena chrysosceles, *Nyland. Ap. Boreal.* p. 218. 15 ♂ ♀.

Female. Length 5–6 lines. — Black; the face covered with short griseous pubescence; the labrum ciliated with bright golden-yellow hairs; the pubescence on the vertex is sparing, and rufo-fulvous; the apical joints of the flagellum piceous beneath. Thorax: the pubescence on the disk rufo-fulvous, sparing, but dense on the sides and on the post-scutellum; on the sides of the metathorax it is much paler; the tegulæ rufo-piceous, the wings fulvo-hyaline, faintly clouded at their apical margins, the nervures ferruginous; the pubescence on the thorax beneath and the fringe on the femora griseous, the floccus yellowish-white; the tarsi and the posterior tarsi rufo-testaceous, the anterior and intermediate tarsi more or less obscure; the scopa of a golden-yellow. Abdomen oblong-ovate, slightly depressed, shining, very delicately and closely punctured; the apical margins of the three intermediate segments have a narrow fringe of white pubescence, the first and second widely interrupted; the apical fimbria bright fulvous; the margins of the segments beneath ciliated with long pale fulvous hairs. B.M.

Male. Length 3½–5 lines.—The face clothed with reddish-brown pubescence, rather paler on the clypeus; the flagellum rufo-testaceous towards the apex beneath, and nearly as long as the thorax; the disk of the thorax has a similar pubescence to the face, on the sides of the metathorax it is much paler, as is also that on the legs; the wings as in the other sex; the tarsi beneath have a golden-yellow pubescence. Abdomen oblong-ovate, convex, slightly shining, very closely and finely punctured; the margins of the segments depressed, the intermediate ones having a narrow fringe of pale pubescence, usually more

or less interrupted, the extreme apex covered with glittering golden-yellow hairs. B.M.

The above descriptions are from examples in the finest condition; the females when old have the pubescence usually rather paler; that of the males becomes entirely cinereous.

This species is extremely abundant near London during May and the two following months; it usually appears about the middle of May, and abounds in the neighbourhood of Hampstead; it burrows in hard sandy pathways; I have frequently captured the sexes *in coitu*, and have received specimens from Scotland and Ireland.

Genus 6. MACROPIS.

Megilla, pt., *Fabr. Syst. Piez.* p. 332 (1804).
Macropis, *Panz. Faun. Germ.* 107. 16 (1809).
Klug, MSS.

Head transverse, about the width of the thorax; the stemmata placed in a slight curve on the vertex; antennæ inserted in the middle of the face; the scape subclavate; the first joint of the flagellum ovate, the second joint narrowed at its base, the apical joint obliquely truncate. The mentum narrowed towards the base, thrice the length of the labium; the labial palpi four-jointed, the basal joint as long as the two following, the apical one shortest; the labium lanceolate, the paraglossæ minute. The maxillary palpi six-jointed, as long as the apical lobe. The superior wings having one marginal and two submarginal cells, the second submarginal cell receiving the two recurrent nervures; the posterior tibiæ and tarsi incrassate, and having a dense scopa of short pubescence in the female. Abdomen ovate.

1. Macropis labiata.

M. nigra, fusca, cinerascenti-villosa; tibiis posticis externe albido-lanatis; metatarsis externe fuscis; abdomine fasciis tribus albidis, prima interrupta.

Macropis labiata, *Panz. Faun. Germ.* 107. 16.
Smith, Zool. iv. 1279. 1.
Nyland. Ap. Boreal. p. 248. 1; *Revis. Ap. Boreal.* p. 269. 1.

Megilla labiata, *Fabr. Syst. Piez.* p. 333. 21 ♂.
Leon Dufour, Ann. Soc. Ent. Fr. vii. 288. t. 9. f. 3 ♂.
Megilla fulvipes, *Fabr. Syst. Piez.* p. 332. 20 ♀, & *Mus. Kiel.*

Female. Length 4 lines.—Black; the head and thorax strongly and closely punctured, the face has a thinly scattered short griseous pubescence; the flagellum beneath fulvo-testaceous. Thorax: a short griseous pubescence on the sides and beneath; the wings subhyaline, the tegulæ rufo-piceous, the nervures ferruginous; the apical joints of the tarsi ferruginous, fringed with fulvous pubescence; on the basal joints as well as on the tibiæ it is rufo-fuscous; the posterior tibiæ densely covered externally with white pubescence, sometimes tinged with yellow; that at the apex as well as that on the basal joint of the tarsi dark fuscous, the tarsi ferruginous beneath. Abdomen shining, very delicately punctured, the apical margins of the segments rufo-piceous, the third and fourth having a narrow white fascia, the first usually interrupted, the apex covered with fuscous pubescence, having a few white hairs at the sides.

Male. Length 4 lines.—Antennæ nearly as long as the head and thorax, the scape having a yellow spot in front, the flagellum fulvo-testaceous beneath; the face below the insertion of the antennæ and a spot at the base of the mandibles yellow; the thorax shining, punctured, and having a thin pale fulvous pubescence, at the sides of the metathorax it is griseous; that on the legs is short and pale fulvous; the apical joints of the tarsi rufo-testaceous, the posterior tibiæ and femora incrassate, the calcaria pale testaceous. Abdomen globose and shining; the apical margins of the third and of the three following segments have a narrow pale marginal fringe, the first interrupted.

B.M.

Of this rare insect only three British collections possess specimens, and these are all males; that in the British Museum was probably the first captured in this country, and was taken by Dr. Leach; the second was met with by Mr. T. Walton in the New Forest; and Mr. Samuel Stevens captured a third at Weybridge, July 4th, 1842. The species is no doubt very rare; not only the precise spot where Mr. Stevens took it, but also the surrounding country has been searched every season since its capture without its being again met with.

Genus 7. CILISSA.

Andrena, pt., *Fabr. Ent. Syst.* ii. 307 (1793).
Melitta, pt., *Kirby, Mon. Ap. Angl.* i. 140. t. 3**c. f. 8, 9 (1802).
Cilissa, *Leach, Edin. Encycl.* 9 (1812).
Kirbya, *St. Farg. Hym.* ii. 145 (1841)
Anthophora, pt., *Fabr. Syst. Piez.* 374 (1804).

Head transverse, the ocelli placed in a curve on the vertex; the flagellum of the antennæ filiform, the apical joint obliquely truncate; the mentum obtuse at the base, and acute in the middle at the apex; the labial palpi four-jointed, not quite so long as the labium; the labium lanceolate, acute at the apex; the paraglossæ minute. The maxillary palpi six-jointed. The wings as in the genus *Andrena*.

The economy of this genus of bees is precisely similar to that of the genus *Andrena*; we are only acquainted with three species which inhabit Europe, two of which occur in England; a third species occurs in Sweden, and a fourth in the United States. These insects are of rare occurrence; the *C. leporina* occurs but rarely in the neighbourhood of London; it burrows in sandy banks; in the month of July 1852 a small colony was discovered on Hampstead Heath.

1. Cilissa hæmorrhoidalis.

C. atra, pallide subpubescens, thoracis limbo fulvescenti; abdomine ovato, basi retuso, ano fulvo-aureo.

Andrena hæmorrhoidalis, *Fabr. Ent. Syst.* ii. 313. 25 ♀; *Syst. Piez.* p. 327. 24.
Panz. Faun. Germ. 65. 20.
Zett. Ins. Lapp. p. 459. 1.
Melitta chrysura, *Kirby, Mon. Ap. Angl.* ii. 172. 110 ♂ ♀.
St. Farg. Hym. ii. 214. 2.
Cilissa hæmorrhoidalis, *Leach, Edin. Encycl.* ix. 155.
Smith, Zool. vi. 2207. 1.
Nyland. Revis. Ap. Boreal. p 268. 3.
Kirbya chrysura, *St. Farg. Hym.* ii. 146. 2.
Nyland. Ap. Boreal. p. 246. 1.

Female. Length 5½–6 lines.—Black; the face clothed with short pale fulvous pubescence; the flagellum, except the extreme base, fulvo-piceous beneath; the margin of the vertex fringed with black pubescence. Thorax: the middle of the

disk clothed with black pubescence, around which it is fulvous, on the sides and beneath it is paler; legs dark rufo-piceous, their pubescence short and fulvous, the scopa bright fulvous, the tarsi beneath ferruginous, the apical joint pale rufo-testaceous; wings subhyaline, faintly clouded at their apical margins, the nervures fusco-ferruginous. Abdomen oblong-ovate, subdepressed, at the base a little pale pubescence; the apical margins of the intermediate segments have a very narrow fringe of white pubescence, frequently more or less obliterated, the fifth and sixth segments densely clothed with golden-fulvous pubescence. B.M.

Male. Length 4½–5 lines.—The face densely clothed with bright pale fulvous pubescence; antennæ subdentate beneath, not quite so long as the thorax, the apex of each joint of the flagellum produced beneath. Thorax: the middle of the disk having a thin black pubescence, the rest of thorax densely clothed with pale fulvous, the legs have a similar clothing, the apical joint of the tarsi ferruginous; wings subhyaline, faintly clouded at their margins, the nervures ferruginous. Abdomen elongate-ovate, convex, the two basal segments have a thin pale pubescence, on the following it is black, intermixed at the sides with pale fulvous hairs. B.M.

This is a very local insect; it is not uncommon however about Shirley, near Croydon; in the month of August, it may be found where the blue-bells grow, for it does not appear to frequent any other flower; I have also met with it at Hawley, Hants; Mr. Walcott has found it in abundance near Bristol.

2. Cilissa leporina.

C. atra, pallide pubescens, antennis pedibusque rufo-testaceis; abdominis segmentis distincte ciliatis.

Apis leporina, *Panz. Faun. Germ.* fasc. 63. 22 ♀.
Anthophora leporina, *Fabr. Syst. Piez.* p. 374. 7.
Melitta tricincta, *Kirby, Mon. Ap. Angl.* ii. 171. 109.
St. Farg. Hym. ii. 213. 1.
Cilissa tricincta, *Leach, Edin. Encycl.* ix. p. 155.
Smith, Zool. vi. 2208. 2 ♂ ♀.
Nyland. Ap. Boreal. Revis. p. 267. 1.
Kirbya tricincta, *St. Farg. Hym.* ii. 145. 1!
Nyland. Ap. Boreal. Supp. 102 ♀.

Female. Length 5 lines.—Black; the face clothed with short pale fulvous pubescence, that on the vertex black; the flagellum,

except the basal joint, rufo-piceous beneath. Thorax: in the middle of the disk the pubescence is black, but sparing, surrounding which it is dense and fulvous; at the sides of the metathorax it is paler; the anterior femora, the coxæ and trochanters are covered beneath with long dense cinereous pubescence; the pubescence on the legs above is pale fulvous, and on the tarsi beneath ferruginous; the legs dark rufo-piceous, the claws pale testaceous; the wings hyaline, their apical margins faintly clouded, the nervures and tegulæ rufo-piceous. Abdomen ovate and shining, the base has a thin pale pubescence, the apical margins of the first and three following segments have a fascia of pale fulvous pubescence, the apical fimbria black. B.M.

Male. Length 5 lines.—The face densely clothed with bright pale fulvous pubescence; the flagellum beneath, except the extreme base, fulvo-piceous; the joints submoniliform; the thorax has a fulvous pubescence intermingled with black hairs in the middle of the disk; the wings and legs as in the other sex. Abdomen oblong-ovate, the two basal segments have a thin pale fulvous pubescence, on the other segments it is black, each having a fringe of pale fulvous pubescence; on the apical segment the pubescence is black in the middle and pale fulvous at the sides. B.M.

The pubescence on both species of this genus is beautifully plumose. The localities known for this insect are Battersea Fields, Hampstead Heath, Gravesend, Erith, Charlton, and Hawley in Hampshire. Little doubt existed of this being the *Apis leporina* of Panzer, as will be seen on referring to the catalogue of *Andrenidæ* in the British Museum; but Dr. Nylander has seen the typical specimen of Fabricius in the museum at Kiel, and his judgment may be confidently relied upon.

Genus 8. DASYPODA.

Andrena, pt., *Fabr. Ent. Syst.* ii. 307 (1793).
Apis, pt., *Fabr. Ent. Syst.* ii. 335.
Melitta, pt., *Kirby, Mon. Ap. Angl.* i. 140. t. 4**c.* cont. (1802).
Dasypoda, *Latr. Hist. Nat.* xiii. 369 (1805).
Trachusa, *Jurine*, p. 250.

The labial palpi four-jointed, placed in a line, the joints subclavate, the basal one longest and stoutest, the apical joint minute; the labium elongate-lanceolate, folded when in repose,

a little longer than the palpi. The maxillary palpi six-jointed, each joint gradually decreasing in length. The ocelli placed in a slight curve on the vertex. The superior wings have one marginal and two submarginal cells; the second submarginal receiving the two recurrent nervures, the first just within at the base, the second at a little more than one-third from its apex.

1. Dasypoda hirtipes.

D. atra, pallide villosa; pedibus posticis fulvo longissime lanatis; abdomine fasciis tribus albidis.

Andrena hirtipes, *Fabr. Ent. Syst.* ii. 312. 24 ♀.
Apis hirta, *Fabr. Ent. Syst.* ii. 335. 92 ♂.
Andrena plumipes, *Panz. Faun. Germ.* 46. 16.
Apis farfarisequa, *Panz. Faun. Germ.* 55. 14 ♂.
Dasypoda hirta, *Fabr. Syst. Piez.* p. 336. 2.
Melitta Swammerdamella, *Kirby, Mon. Ap. Angl.* ii. 174. 111.
Dasypoda hirtipes, *Latr. Hist. Nat.* xiii. 369. 1.
St. Farg. Hym. ii. 229. 1. t. 22. f. 1 ♀, 2 ♂.
Smith, Zool. vi. 2241. 1.
Nyland. Ap. Boreal. p. 225. 1.
Trachusa hirtipes, *Jurine, Hym.* p. 250.
Dasypoda plumipes, *Leach, Edin. Encycl.* ix. 155.
Dasypoda Swammerdamella, *Curtis, Brit. Ent.* viii. t. 367 ♂ ♀.

Female. Length 6–7 lines.—Black; the pubescence on the face below the insertion of the antennæ cinereous, above it is black, sparing on the vertex. Thorax: the pubescence on the middle of the disk black surrounded with fulvous, on the sides and beneath it is very pale; beneath, densely clothed with cinereous pubescence; wings hyaline, faintly clouded at their apical margins, the nervures rufo-piceous; the anterior and intermediate tarsi have the basal joint above clothed with fuscous pubescence, beneath it is fulvous; the scopa very long, dense and bright fulvous. Abdomen subovate, at the base a little cinereous pubescence, the three intermediate segments have a fascia of white pubescence on their apical margins, the first interrupted; the apical fimbria sooty-black.

Male. Length 5–6½ lines.—The pubescence on the clypeus, cheeks, thorax beneath, and the fringe of the anterior and intermediate femora white; on the vertex and thorax above it is fulvous; the legs have a long pale fulvous pubescence; the wings subhyaline, the nervures and tegulæ ferruginous; the tarsi have the claw-joint rufo-testaceous. Abdomen ovate lan-

ceolate, the apical margins of the segments testaceous, each segment has a long fringe of pale fulvous pubescence.

This is perhaps the most beautiful bee found in the country; the appearance of the female when loaded with pollen is sufficiently singular to attract the attention of the most apathetic observer; the description of each sex is from specimens in the most perfect and beautiful state of colouring, having been reared from cells dug up in spring. The males from exposure are frequently met with entirely hoary; the females do not vary much in colouring. The species is not found in the immediate vicinity of London, but has been taken in the sand-pits opposite Charlton Church. It abounds in Sandown Bay, Isle of Wight, particularly on the top of the cliffs. It is very abundant below Southend; and occurs at Paul's Cray, Gravesend, and Birch Wood, Kent; at Weybridge, and at Hawley, Hants; its time of appearance is the beginning of August; but the female has been captured as late as the 6th of September.

Fam. 2. Apidæ.

Apiariæ, *Latr. Hist. Nat. Ins.* (1802).
Apida, *Leach, Edin. Encycl.* (1812).
Apides, *Leach, Edin. Encycl.* (1812).
Apidæ, *Leach, Edin. Encycl.* (1817).
Apites, *Newm. Ent. Mag.* ii. (1834).

Subfamily 1. ANDRENOIDES.

Andrenoïdes, *Latr. Fam. Nat.* (1825).
Panurgites, *Newm. Ent. Mag.* ii. (1834).
Panurgides, *Westw. Intr. Class. Ins.* (1840).

Genus 1. PANURGUS.

Apis, pt., *Scop. Ent. Carn.* p. 298 (1763).
Philanthus, pt., *Fabr. Ent. Syst.* ii. 288 (1793).
Andrena, pt., *Panz. Faun. Germ.* fasc. 69 (1800).
Trachusa, pt., *Panz. Faun. Germ.* fasc. 96 (1800).
Dasypoda, pt., *Fabr. Syst. Piez.* p. 335 (1804).
Panurgus, *Panz. Krit. Revis.* 211 (1805).
Eriops, *Klug, Illig. Mag.* vi. (1806).

Of the insects included in this genus, we are only acquainted with two species indigenous to this country; indeed it is one of

very limited extent, since only two others are known, one European, the other African. These bees are very similar in structure to the *Andrenidæ*; the females possess the scopa on the tibiæ, and the apical fringe on the abdomen, and their tarsi are of similar construction to those of the *Andrenidæ*, but their tongue is folded at the apex when in repose. In habit they are precisely similar to *Andrena*, excavating burrows and laying up a store of pollen and honey in a similar manner; they are bees of summer, the most abundant species being the *Panurgus Banksianus*, which forms large colonies in retired sandy spots on heaths, making its appearance in July: for years such a community has existed on the north side of the Vale of Health, Hampstead Heath, where in spring I have met with the larvæ in small cells about six inches beneath the surface, and have reared both sexes; they do not change to nymphs many days before arriving at their perfect condition, usually twenty or twenty-five days. The second species is more local, but very plentiful in many situations, forming colonies in hard trodden footpaths: a light-coloured fly (*Miltogramma*) is frequently to be seen entering its burrows. These bees do not appear to frequent any other flowers than those of the Mouse-ear Hawkweed.

1. Panurgus calcaratus.

P. ater, nitidus, glabriusculus; antennis dimidiato-rufis.

Apis calcarata, *Scop. Ent. Carn.* p. 301. 803 ♂.
Philanthus ater, *Fabr. Ent. Syst.* ii. 292. 13 ♂.
Apis ursina, *Kirby, Mon. Ap. Angl.* ii. 178. 1, var. β ♀.
Apis Linnæella, *Kirby, Mon. Ap. Angl.* ii. 179. 2 ♂.
Andrena lobata, *Panz. Faun. Germ.* 72. 16 ♂.
Dasypoda lobata, *Fabr. Syst. Piez.* p. 336. 3 ♂.
Trachusa lobata, *Panz. Faun. Germ.* 96. 18 ♀.
Panurgus ater, *Panz. Krit. Revis.* p. 211 ♂.
Panurgus unicolor, *Spin. Ins. Lig.* fasc. 2. p. 54. 42?
Panurgus lobatus, *Latr. Encycl. Méth.* viii. 719. 3 ♂ ♀.
St. Farg. Hym. ii. 225. 2 ♂ ♀.
Curtis, Brit. Ent. iii. p. 102.
Nyland. Ap. Boreal. p. 224. 1.
Panurgus calcaratus, *Smith. Zool.* iv. 1452. 2 ♂ ♀

Female. Length 3½–4 lines.—Jet-black, shining, nearly naked; the face has a little black pubescence, the scape pubescent, the flagellum, except two or three of the basal joints, pale testaceous beneath. The disk of the thorax very smooth and shining, the metathorax rounded behind; the wings hyaline, the ner-

vures dark rufo-testaceous; the posterior tibiæ and basal joint of the tarsi have a dense scopa of fulvous pubescence, the calcaria and apical joints of the tarsi ferruginous. Abdomen ovate, the margins of the segments subdepressed, the apical fimbria fuscous. B.M.

Male. Length 3–4 lines.—Very closely resembling the female, but having the head larger than the thorax, sometimes half as wide again; the flagellum, except two or three of the basal joints, pale rufo-testaceous; the posterior femora have an obtuse tooth towards their base beneath; the posterior tibiæ clavate, bent inwards, the tibiæ and tarsi have a scattered pale fulvous pubescence, the calcaria and apical joint of the tarsi pale ferruginous. B.M.

This species is not found in the immediate vicinity of London; the nearest locality is the north-east corner of Blackheath, and along the road-side leading to Charlton. In the months of July and August this bee will be found frequenting the Mouse-ear Hawkweed, and in some localities it is plentiful, but is very local; it occurs at Luccomb Chine, and at the landslip at Bonchurch, Isle of Wight; at Betsome, near Darent Wood, Kent, at Weybridge, and at Hawley, Hants; the males may be found, towards evening, enclosed in the flowers, three or four in some instances; and by this means a number may be taken.

2. Panurgus Banksianus.

P. ater, supra glabriusculus; pedibus posticis fulvo-hirsutissimis, in mare atris.

Apis Banksiana, *Kirby, Mon. Ap. Angl.* ii. 179. 3 ♂.
Don. Brit. Ins. xii. 26. t. 403. f. 2.
Apis ursina, *Kirby, Mon. Ap. Angl.* ii. 178. 1, not var. β.
Dasypoda ursina, *Latr. Hist. Nat.* xiii. 370. 2 ♀.
Trachusa atra, *Panz. Faun. Germ.* 96. 19 ♂.
Panurgus ater, *Latr. Encycl. Méth.* viii. 720. 5 ♂ ♀.
Spin. Ins. Lig. fasc. 3. p. 196. 1.
St. Farg. Hym. ii. 226. 4.
Nyland. Ap. Boreal. p. 224. 1.
Panurgus ursinus, *Curtis, Brit. Ent.* iii. t. 101.
Smith, Zool. iv. 1451. 1.

Female. Length 4½–5¼ lines.—Black, shining and nearly naked, the face below the insertion of the antennæ has a short black pubescence, and the sides of the head and cheeks are thinly clothed with long black hairs; the labrum ciliated with bright

yellow hairs, the mandibles ferruginous at their apex; the flagellum nigro-piceous beneath. Thorax: the wings subhyaline, the nervures ferruginous; sometimes the wings are slightly fuscous; the tegulæ rufo-testaceous; the femora, and anterior tibiæ at their base above, have a black pubescence; the intermediate tibiæ, the apex of the anterior pair and the tarsi have a fulvous pubescence; the posterior tibiæ and basal joint of the tarsi have a dense scopa of long bright fulvous pubescence. Abdomen ovate, the margins of the segments depressed, the apical fimbria fuscous. B.M.

Male. Length 5 lines.—Very closely resembling the female; but the head is wider and more pubescent; the tibiæ and tarsi have a thin fulvous pubescence, the apical joints of the latter rufo-testaceous; the apex of the abdomen bilobate, the lobes ferruginous. B.M.

This species is much more abundant than *P. calcaratus*. It abounds on Hampstead Heath, and is met with on many of the heaths in Kent, Surrey and Hampshire; the time of its appearance is July and August. It has not been found in the north of England or in Scotland.

Subfamily 2. CUCULINÆ, *Latr.*

Genus 2. NOMADA.

Apis, pt., *Linn. Faun. Suec.* p. 419 (1761).
Nomada, pt., *Fabr. Syst. Ent.* 388 (1775).

Body destitute of pollinigerous appendages. Head transverse, as wide as the thorax; antennæ geniculated, filiform, nearly as long as the thorax; the labrum transverse, its anterior margin rounded; mandibles bidentate, in the males simple, and rounded at their apex. The mentum slightly narrowed at the base, the labium of the same length as the mentum, broad and narrowed a little before the apex, which is rounded; the labium is grooved and transversely striated; the paraglossæ about one-fourth the length of the labium; the labial palpi four-jointed, continuous, a little shorter than the labium, the basal joint longer than the three following, the second about one-fifth of the length of the basal joint, the two following each shorter than the pre-

ceding. The maxillary palpi six-jointed, nearly as long as the apical lobe; the basal joint minute, the second and third joints of about equal length, the remainder gradually decreasing in length, and each more slender than the preceding. The superior wings have one marginal and three submarginal cells, the second submarginal receiving the first, and the third the second recurrent nervure. Legs simple in both sexes. Abdomen: the apical segment truncate at the apex in the females, acute in the males.

The bees belonging to this genus are popularly known by the name of Wasp-bees, from their close resemblance in their gay colouring to the smaller species of *Vespidæ*; they are however true bees, and constitute the most beautiful of all the genera found in this country; notwithstanding the generally received history of their economy, we shall search in vain for much precise information. In the Entomological Magazine we learn that they deposit their eggs in the nests of other bees at the time when the working bees deposit theirs; and that when hatched, the larva being stronger and larger than the rightful possessor of the cell, it consumes the food of its companion and starves it to death: all this however is mere conjecture; the larva of these parasites must always be smaller than that of the working bee. No one appears to know anything beyond the mere fact of their entering the burrows of *Andrenidæ* and *Apidæ*, except that they are found in the cells of the working bees in their perfect condition: it is most probable that they deposit on the provision laid up by the working bee, that they close up the cell, and that the working bee, finding an egg deposited, commences a fresh cell for her own progeny. My reason for thinking it probable that the parasite closes the cell, is that I have frequently captured *Nomadæ* and *Melectæ* with masses of clay attached to their posterior tibiæ; and in the well-known genus of exotic parasitic bees, *Crocisa*, specimens are of frequent occurrence which have masses of clay or mixed earth on their tibiæ; this however requires, and is deserving of, further investigation. I have found several of the species in the cells of *Andrenidæ*—these will be mentioned under the respective species. It is, however, necessary to record one instance which throws some light upon the economy of the genus. Some years ago, in the month of June, I met with a large colony of *Eucera longicornis*, and observed great numbers of *Nomada sexfasciata* flying about amongst the bees, and occasionally entering into and issuing from their burrows. In the beginning of April of the following year I visited the locality for the purpose of obtaining males of the *Nomada*, as very few were

found when the colony was first discovered: the cells of *Eucera* were found at about the depth of eight inches in a stiff clayey soil; of these a considerable number were obtained: on examination, many of the bees were found to be in the pupa state, some far advanced towards their perfect condition, others still larvæ; on opening one cell, it was found to contain two specimens of *Nomada sexfasciata*. Since the former visit I have on several occasions obtained the cells of *Eucera*, and have endeavoured to find the larva of *Nomada*, but in vain; perfect individuals of *N. sexfasciata* have been found in the cells of *Eucera* on several occasions, usually two in each cell, and once a pair of *N. alternata*.

Another circumstance connected with these parasites remains to be noticed. Certain species appear to be constant in their attacks on particular species of *Andrena*, others as constantly on those of *Halictus*; the species *Nomada varia* appears to confine its attacks to the nests of *Halictus abdominalis* and *H. rubicundus*; *N. solidaginis* to that of *H. leucozonius*; *N. furva* enters the burrows of *H. morio*; but I would by no means be understood as stating these combinations to be undeviating; it will no doubt be found that many species attach themselves to any bee which supplies a suitable provision for its larva.

1. Nomada ruficornis.

N. ferruginea; thorace lineis tribus longitudinalibus atris; abdomine maculis fasciisque flavis.

Apis ruficornis, *Linn. Faun. Suec.* 1707; *Syst. Nat.* i. 958. 34, & *Cab. Mus. Linn. Soc.* ♀.
Kirby, Mon. Ap. Angl. ii. 210. 27.
Nomada ruficornis, *Fabr. Syst. Ent.* p. 389. 3; *Ent. Syst.* ii. 347. 7; *Syst. Piez.* p. 309. 2.
Rossi, Faun. Etrus. ii. 112. 933.
Panz. Faun. Germ. 55. 18.
Latr. Hist. Nat. xiv. 50. 1.
Schäff. Germ. Zeits. i. 279. 9.
St. Farg. Encycl. Méth. viii. 366. 7 ♂ ♀; *Hym.* ii. 498. 29.
Blanch. Hist. Nat. Ins. iii. 411.
Smith, Zool. ii. 596. 9.
Nyland. Ap. Boreal. p. 180. 10.
Nomada flava, *Panz. Faun. Germ.* 55. 21 ♂.
Fabr. Syst. Piez. p. 391. 4.
Lucas, Explor. Sc. Algér. iii. 221. 165.
Nyland. Ap. Boreal. p. 179. 8.
Apis flava, *Kirby, Mon. Ap. Angl.* ii. 186. 8 ♂.

Apis leucophthalma, *Kirby, Mon. Ap. Angl.* ii. 197. 16 ♂ var.
Nomada conjungens, *Schäff. Germ. Zeits.* i. 279. 8 ♂.

Female. Length 3–5 lines.—Head and thorax black, the clypeus and a spot above it, a line encircling the eyes, the labrum, mandibles and antennæ rufous; the scape has sometimes a black line at the sides. Thorax: the collar, tubercles, and a large patch on the sides beneath the wings, an epaulet over the tegulæ, the scutellum, two minute spots beneath uniting with a larger patch on each side of the metathorax, two broad stripes on the disk, the tegulæ and legs, rufous; the femora more or less black at the base beneath; the coxæ and trochanters also sometimes stained; the wings fusco-hyaline and having a dark narrow fuscous cloud at their apical margins. Abdomen rufous, the base and the apical margins more or less black, the second segment having on each side a large angular yellow macula, the two following a broad fascia, and the fifth a large quadrate spot, yellow; sometimes obscurely variegated with yellow-testaceous bands or spots beneath. B.M.

Male. Length 3–4½ lines.—The scape in front, the clypeus, the face on each side, the labrum and mandibles, yellow; the latter ferruginous at their tips; the flagellum ferruginous, four or five of the basal joints above, as well as the scape above, black. Thorax black; the tubercles, two spots on the scutellum, and the legs rufous; the coxæ, except at the apex, black; the trochanters behind, the anterior and intermediate femora beneath at the base, and the posterior pair, except a line above, black; sometimes a black line on the tibiæ behind. Abdomen rufous, the base black, the second and following segments having a broad yellow band; the apical margins of the segments rufo-piceous; beneath, the second and following segments have a transverse broad yellow macula; sometimes entirely rufous beneath, or varied with indistinct fuscous bands and yellow spots; the yellow bands on the abdomen above are frequently much attenuated in the middle, one or two of the apical ones being sometimes interrupted. B.M.

It were vain to attempt to describe all the shades of variety in the markings of this species, particularly those of the males; but the most prominent are pointed out, and the extremes most commonly met with; some of the very small examples of the males have the scape and two or three joints of the flagellum nearly black; the brightness of the rufous colouring also varies considerably, from a deep brick-red to a light red; the dark-coloured examples have the wings also of deeper hue; the spots on the metathorax of the female are sometimes obliterated, or

partially so; the spots on the scutellum of the male frequently disappear; and a variety is met with, but rarely, in which the rufous spots are replaced by yellow ones. This species may be noticed entering the burrows of *Andrena Trimmerana*, *A. nitida*, *A. varia* and *A. fulva*; its attacks are very general.

N. ruficornis is perhaps the most universally distributed species of the genus; it is found in all parts of the United Kingdom, throughout Europe, and also in North America and Canada.

2. Nomada lateralis.

N. atra, thorace rufo obscure quadri-lineato; abdomine rufo, segmento secundo macula magna utrinque laterale, reliquis margine postice pallide flavescentibus.

Nomada lateralis, *Panz. Faun. Germ.* 96. 20 ♂ & 21 ♀.
Schäff. Germ. Zeits. i. 227. 5.
St. Farg. Encycl. Méth. viii. 370. 25.
Schäff. Icon. Ins. Ratisb. t. 50. f. 10.
Smith, Zool. ii. 601. 16 ♂ ♀.
Nomada melanosoma, *Schäff. Germ. Zeits.* i. 280. 11 ♂.

Female. Length 3–4 lines.—Head and thorax black, the mandibles, labrum, clypeus and a minute spot above, a line encircling the eyes and the antennæ, red, the latter have their scape fuscous above, and are as long as the thorax. Thorax: the collar, tubercles, a large patch on the breast, the tegulæ and scutellum, red; four obscure red lines on the disk of the thorax rufous; the femora, tibiæ and tarsi red; the femora more or less black towards their base beneath, the posterior pair black within, except at their apex; the coxæ and trochanters red at their apex. Abdomen rufous, the base black, the second segment having on each side a large subovate yellow macula, pointed within, the third has a minute yellow macula, the fourth a transverse subinterrupted fascia, the fifth a square yellow patch; beneath immaculate, or with the margins of the segments slightly piceous.

Male. Length 3¾–4½ lines.—Head and thorax black, the labrum and clypeus clothed with a silvery-white pubescence; the clypeus anteriorly, the face on each side, and a narrow line along the inner margin of the eyes as high as the insertion of the antennæ, the labrum and mandibles, yellow, the latter ferruginous at their tips; the scape yellow in front, black behind; the flagellum rufous, three or four of the basal joints have a dark stain above. Thorax: the disk has a thin clothing of

pale ochraceous pubescence; on the sides, metathorax and beneath it is white, the femora having a thin fringe of the same; the legs red, the coxæ, trochanters, and femora beneath, as well as a stain on the tibiæ behind, black; wings subhyaline in both sexes, the superior pair fuscous at their tips. Abdomen variegated with spots as in the female, but having those on the third segment larger, and the general colour of the abdomen of a lighter red; beneath, the segments have a more or less distinct transverse yellow stripe, narrowed or interrupted in the middle. B.M.

This is a local and very beautiful species; it is remarkable for having its antennæ longer than is usual in these insects. Formerly I used occasionally to meet with a specimen or two on Hampstead Heath about a colony of *Andrena albicrus*, but they have long disappeared from that locality; a few years ago, a colony of *Andrena longipes* was discovered at Highgate, accompanied by this species in abundance, both having been previously scarce. The latter locality is on the London side of Highgate Archway, to the west of the high road.

3. Nomada baccata.

N. atra, capite thoraceque ferrugineo variegatis: abdomine pedibusque pallide ferrugineis: abdominis segmentis albo maculatis.

Nomada baccata, *Smith, Zool.* ii. 604. 20 ♂ ♀; *Cat. Hym. Acul.* 84. 3.

Female. Length 3 lines.—Pale rufous; the ocelli enclosed in a transverse black patch, which does not pass beyond them; from each side of the anterior ocellus a divergent black line passes downwards, widening and uniting at the insertion of the antennæ; a narrow black line also runs a short way down the margins of the clypeus; the cheeks are also black, the tips of the mandibles rufo-piceous. Thorax: the disk has three black lines passing from the collar to the scutellum, the central one broadest; the sides of the thorax behind the wings black, the metathorax and scutellum usually of a paler red than the disk; the breast has a black stain in front; the legs red, the femora with a fuscous stain at their base beneath; the wings subhyaline, their apical margins having a fuscous cloud, the tegulæ and nervures ferruginous. Abdomen: the basal segment maculated at its base with black spots forming a letter M; the second segment has a large macula, rounded on the

outside and pointed within, the third a minute angular spot at the extreme lateral margin, the fourth a transverse interrupted line, and the fifth a square macula, white; beneath rufous.

B.M.

Male. Length 3 lines.—Head and thorax black; the clypeus, labrum, mandibles and scape in front, pale yellowish-white; the scape black behind; the flagellum red, the joints having a fuscous line above, darkest towards their base; the head and thorax above have a thin hoary pubescence; on the thorax beneath it is shorter, but more dense; two spots on the scutellum and the tegulæ rufo-testaceous; the legs of a paler red than in the other sex; wings as in the female. Abdomen pale rufous, the extreme base black; two transverse white spots on the first segment; the second has two large spots as in the female, the following segments have elongated white spots on each side, those on the fifth uniting, the sixth has a square patch; beneath, a transverse white line on the third and fourth segments in the middle, but frequently immaculate.

I first had the pleasure of discovering this beautiful species near Sandhurst some years ago; it was parasitic on a new species of *Andrena*, subsequently described as *A. argentata*: in 1843 the latter was met with at Weybridge, and the same parasite infested its colony. Mr. Dale has met with the *Andrena* in Hampshire, and one or two have been taken on Hawley Green, Hants.

4. Nomada ochrostoma.

N. atra; labio, clypeo, facieique lateribus ferrugineis; thorace lineis tribus longitudinalibus atris, scutello rufo; abdomine flavo-maculato. *Mas*, scutello sanguineo, abdomine rufo, fasciisque interruptis, flavis, variegato.

Apis ochrostoma, *Kirby, Mon. Ap. Angl.* ii. 209. 26 ♂.
Nomada ochrostoma, *Schäff. Germ. Zeits.* i. 280. 13 ♂.
Smith, Zool. ii. 596. 9.
Nyland. Ap. Boreal. p. 179. 9, & *Revis. Ap. Boreal.* p. 229. 4.
Apis Hillana, *Kirby, Mon. Ap. Angl.* ii. 208. 25, ♂ var.
Nomada vidua, *Smith, Zool.* ii. 602. 18 ♀.

Female. Length 4–4½ lines.—Head and thorax black, the labrum, mandibles, clypeus, orbits of the eyes, and a line passing behind the ocelli, ferruginous; the antennæ ferruginous, above black. Thorax: the collar, tubercles, a large patch beneath the wings, a smaller ovate spot on the breast beneath, two longitudinal stripes on the disk of the thorax, an epaulet

over the tegulæ, reaching the scutellum and the post-scutellum, red; the wings subhyaline, their apical margins having a dark fuscous cloud, and a pale macula beyond the third submarginal cell; the legs red, the coxæ, trochanters, and femora, beneath, black. Abdomen ferruginous, black at the base; the second segment has on each side a large rounded macula, the third a minute spot, the fourth an interrupted transverse band, and the fifth a square patch of yellowish-white; the margins of the segments usually dark rufo-piceous; beneath, immaculate.

B.M.

Male. Length 4 lines.—Head and thorax black: the face clothed with silvery pubescence, the clypeus, labrum and mandibles yellow, the latter ferruginous at their tips; the scape black, having sometimes a ferruginous line within, the flagellum ferruginous, more or less fuscous towards the base above. Thorax: the collar, tubercles, tegulæ and two spots on the scutellum, frequently united, red; the legs red, the coxæ and trochanters black, except their extreme apex; the anterior and intermediate femora black at their base beneath, the posterior pair black beneath, except their extreme apex. Abdomen ferruginous, black at the base, the second segment has on each side a large rounded macula, the third a smaller spot or line, the fourth a short stripe, and usually a minute dot outside, the fifth a transverse interrupted stripe, the sixth a broader uninterrupted one, yellowish-white; beneath, a minute yellow spot at the apex. B.M.

Small specimens of the male have usually the scape, coxæ and trochanters entirely black.

This is a local species, although widely distributed; it was formerly found at Colney Hatch Wood; it is not uncommon at the side of Bishop's Wood, Hampstead, where it has been observed flying about the burrows of *Andrena labialis*, during the month of May. It appears to frequent hedge-rows and wood sides, in preference to open heaths or sandy situations.

5. Nomada borealis.

N. atra, clypei margine anguste rufo; thorace toto nigro; abdominis segmento secundo macula marginali triangulari flava, reliquis luteo-fasciatis.

Nomada borealis, *Zett. Ins. Lapp.* p. 470. 1 ♀.
Nyland. Ap. Boreal. p. 181. 11.
Nomada inquilina, *Smith, Zool.* ii. 605. 21 ♂ ♀; *Cat. Acul. Hym.* 85. 5.

Female. Length 4–5 lines.—Head and thorax black; the margin of the clypeus, the labrum, mandibles, and a spot at the vertex of the eyes, ferruginous; the antennæ beneath, the apex of the joints above, and the extreme base and apex of the scape, ferruginous; the third joint sometimes entirely so; the labrum has a minute tooth in the middle. Thorax: the tegulæ, tubercles, and two spots on the scutellum, frequently united, ferruginous; the coxæ and femora black, their extreme apex ferruginous; the tibiæ and tarsi ferruginous, the anterior tibiæ having a black spot behind. Abdomen ferruginous, the base black; the second segment has a large ovate macula, pointed within, the third a smaller spot, or sometimes a narrow transverse line, the fourth a broader fascia, with a minute spot beyond its termination laterally, and the fifth a quadrate macula, yellow; the basal segment has usually a minute black dot on each side, its apical margin, as well as those of the three following segments, piceous. B.M.

Male. Length 4 lines.—Head and thorax black, the anterior margin of the clypeus narrowly yellow; the labrum and mandibles yellow, the latter ferruginous at their tips; the face thinly covered with silvery-white pubescence, the antennæ black, the flagellum rufo-testaceous beneath. Thorax thinly covered with a long griseous pubescence; the wings subhyaline, faintly clouded at their apical margins, the nervures and tegulæ rufo-testaceous; legs black, the anterior and intermediate femora above, the tibiæ and tarsi, ferruginous; the anterior and intermediate pairs have a black stain behind. Abdomen obscure ferruginous, the base black, sometimes two yellow spots on the basal segment, the second having a broad transverse yellow fascia, usually interrupted; the four following segments have each a transverse fascia, the two first usually slightly interrupted, but frequently the fasciæ are entire; beneath, obscure rufo-piceous; sometimes the third and fourth segments have an obscure transverse yellow stripe, but are usually immaculate. B.M.

This species is rarely met with; it was found on Hampstead Heath some years ago, parasitic on *Andrena Clarkella*, and has been once or twice taken since; the species was discovered near Leominster by Mr. Newman. Since it was described under the name of *N. inquilina*, it has been received from Dr. Nylander of Helsingfors, who reports that it is the *N. borealis* of Zetterstedt. This insect appears in the beginning of April.

6. Nomada signata.

N. atra, thorace lineis quatuor longitudinalibus ferrugineis; abdomine rufo, fasciisque flavis latis ornato.

Nomada signata, *Jurine, Hym.* t. 11. gen. 31 ♀.
St. Farg. Encycl. Méth. 370. 25.
Smith, Zool. ii. 602. 17 ♂ ♀.
Nomada flava, *Schäff. Germ. Zeits.* 279. 9.

Female. Length 4–5 lines.—Head and thorax black, the clypeus anteriorly, a spot above it, the orbits of the eyes, the antennæ, labrum and mandibles ferruginous; the scape has a black line outside. Thorax: the collar, tubercles, a large patch on the breast on each side, a minute dot under the wings, four longitudinal stripes on the disk, and the scutellum, ferruginous; wings subhyaline, their apical margins having a dark fuscous cloud, the tegulæ ferruginous; the legs ferruginous, the base of the femora black; the metathorax variegated on each side with irregular stripes or spots. Abdomen ferruginous, the first segment black at its base and having a broad irregularly waved fascia, sometimes interrupted; the following segments have a broad yellow band, leaving a narrow rufo-piceous border on the apical margins; the second, third and fourth segments beneath have a transverse broad yellow stripe; the stripes frequently obscure. B.M.

Male. Length 4–5 lines.—This sex closely resembles the female, but differs in having the labrum, margin of the clypeus and the mandibles yellow; the antennæ fuscous above; the clypeus has a silvery pubescence; the thorax black, the tubercles yellow, the tegulæ and two dots on the scutellum ferruginous; the basal segment of the abdomen has sometimes an obscure yellow fascia, but it is usually obliterated, and there are merely two black dots. B.M.

The only localities known for this species are Highgate, and Hampstead Heath; it appears in April, and is usually abundant.

7. Nomada Lathburiana.

N. atra, scutello punctis duobus flavescentibus; abdomine ferrugineo, fasciis flavis, medio attenuatis.

Apis Lathburiana, *Kirby, Mon. Ap. Angl.* ii. 183. 6 ♂.

Apis rufiventris, *Kirby, Mon. Ap. Angl.* ii. 187. 9 ♀.
Nomada rufiventris, *Smith, Zool.* ii. 590. 2 ♂ ♀
Nomada Marshamella, *Nyland. Ap. Boreal.* p. 176. 3.

Female. Length 4–5½ lines.—Head and thorax black, the clypeus and a spot above it, the orbits of the eyes, the labrum, mandibles and antennæ, ferruginous, the scape black above. Thorax: the tubercles and two spots on the scutellum yellow; a stripe down the breast in front and the legs ferruginous; the coxæ more or less fuscous, and the posterior femora and tibiæ having a black stain beneath; the wings subhyaline, their apical margins having a fuscous cloud, the tegulæ reddish-yellow. Abdomen ferruginous, the base black; the apical margins of the first and three following segments rufo-fuscous; the apical margins bright yellow, the fifth entirely yellow; beneath ferruginous, the apical margins of the segments black. B.M.

Male. Length 4–5 lines.—Head and thorax black; the scape of the antennæ in front, the face below their insertion, the orbits of the eyes, interrupted at their vertex, yellow; the labrum and mandibles yellow; the flagellum ferruginous, three or four of the basal segments black above. Thorax: the tubercles, tegulæ, two minute dots on the scutellum, yellow; the anterior legs yellow, the intermediate and posterior pairs ferruginous. their coxæ and femora black beneath, the knees and the intermediate tibiæ and tarsi yellow, the latter stained with ferruginous. Abdomen as in the other sex, the yellow bands being brighter and rather broader. The wings are nearly hyaline, their apical margins faintly clouded, the nervures pale testaceous. B.M.

This beautiful species is very local, but appears to be widely distributed; it is not uncommon at Hampstead and has been received from Scotland; it is parasitic upon *Andrena labialis*.

8. Nomada varia.

N. atra; scutello sulphureo; abdomine flavo, basi ferrugineo, fasciis quatuor nigris. *Mas,* scutello, tibiis extus, abdominisque fasciis posticis flavis, segmento basali rufo.

Nomada fucata, *Panz. Faun. Germ.* 55. 19 ♀.
Fabr. Syst. Piez. p. 390. 3.
Spin. Ins. Lig. fasc. i. p. 151. 1.
Schäff. Germ. Zeits. i. 284. 22.
Smith, Zool. ii. 593. 5 ♂ ♀.

Nomada varia, *Panz. Faun. Germ.* 55. 20 ♂.
Spin. Ins. Lig. fasc. i. 152. 6.
St. Farg. Hym. ii. 489. 22 ♂. t. 24. f. 3 ♀, 4 ♂.
Apis varia, *Kirby, Mon. Ap. Angl.* ii. 185. 7 ♂.
Apis fucata, *Kirby, Mon. Ap. Angl.* ii. 195. 15 ♀.

Female. Length 4–4½ lines.—Black; the clypeus and a spot above it, the inner orbits of the eyes, the labrum, mandibles, and antennæ rufous. Thorax: the collar on each side, the tubercles, tegulæ and scutellum, sulphur-yellow; sometimes a minute dot on the post-scutellum; wings testaceo-hyaline, very faintly clouded at their margins, the nervures ferruginous; legs rufous, the coxæ, the intermediate and posterior trochanters, and the extreme base of the femora, black. Abdomen: the basal segment ferruginous, the following yellow: the extreme base, the apical margin of the first, and the apical and basal margins of the three following segments, black. B.M.
Var. β. The apical margin of the basal segment rufo-piceous.
Var. γ. The second segment ferruginous in the middle.

Male. Length 4–4½ lines.—Head and thorax black; the scape in front, the clypeus and a spot above it, the face on each side, the labrum and mandibles, yellow, the latter rufo-piceous at their apex; the flagellum ferruginous, a black dot on four or five of the middle joints, and sometimes a narrow black line on the scape behind. Thorax: the collar on each side, the tubercles, a line on the breast in front, the tegulæ, scutellum, and usually a minute dot beneath it, yellow; wings as in the female; the coxæ and trochanters black, the anterior pair yellow in front, femora ferruginous, their extreme base black beneath; the knees, and all the tibiæ and tarsi yellow, and more or less stained with ferruginous. Abdomen as in the female, in rare instances there is an interrupted yellow line on the first segment. B.M.

This extremely beautiful species is very local, not found in the London district: some years ago it was met with sparingly in Kent, during the month of July, in a lane leading from Betsom to Green Street Green, at the side of Darenth Wood; in 1851 "its metropolis" was discovered in Sandown Bay, at the back of the Isle of Wight; here it abounded in the month of July; it is parasitic on *Halictus rubicundus* and *H. leucozonius*.

9. Nomada xanthosticta.

N. atra; antennis subtus, scutellique punctis ferrugineis; abdomine rufo, segmentis secundo et tertio maculis duabus flavis.

Apis xanthosticta, *Kirby, Mon. Ap. Angl.* ii. 212. 28 ♀.
Nomada xanthosticta, *Smith, Zool.* ii. 600. 15 & vi. 2214; *Cat. Acul. Hym.* 86. 9.

Female. Length 2–3¼ lines. — Head and thorax black; the flagellum beneath, the mandibles and the labrum ferruginous, the latter obscurely so, sometimes black, the scape black. Thorax: the tegulæ ferruginous, yellow in front, the tubercles yellow; the scutellum having sometimes two minute obscure ferruginous spots; wings subhyaline, their apical margins having a fuscous cloud; the legs ferruginous, the coxæ, the trochanters, the femora beneath, the tibiæ above, and the basal joints of the posterior tarsi above, fuscous. Abdomen ferruginous, the extreme base black, the apical margins of the first and second segments faintly rufo-piceous, the apical margin of the third and the basal margin of the fourth narrowly rufo-piceous; the second and third segments have on each side a round yellow macula, that on the latter minute; beneath, immaculate.

Mr. Rudd captured a specimen of this species some years ago at Yarm in Yorkshire; a second specimen occurred near Wakefield in Yorkshire, and a third was taken near Newcastle by Mr. Hewitson. Mr. Kirby did not know the locality of his insect.

10. Nomada flavo-guttata.

N. atra; antennis fulvis; abdomine rufo, punctis quatuor luteis.

Apis flavoguttata, *Kirby, Mon. Ap. Angl.* ii. 215. 31 ♂.
Nomada flavoguttata, *Smith, Zool.* ii. 598. 12 ♂ ♀.

Female. Length 2⅓–3 lines. — Head and thorax black, the clypeus in front, the face on each side, the orbits of the eyes, the labrum, mandibles and flagellum, ferruginous, the latter fuscous above. Thorax: the collar, tubercles, a spot beneath the wings, a larger one on the breast, the scutellum and post-scutellum, ferruginous; two obscure ferruginous abbreviated lines on the disk; wings subhyaline, iridescent, and having a dark cloud at their apical margins; the coxæ, trochanters, base of the anterior and intermediate femora, and the posterior pair beneath, black; the tibiæ, tarsi and femora above, ferruginous.

Abdomen ferruginous, the base black; the second and third segments have on each side a round yellow macula, the second pair smallest; the margins of the segments rufo-piceous. B.M.

Var. β. The legs almost entirely ferruginous.

Var. γ. The spots on the abdomen almost, or entirely obliterated.

Male. Length 2–2½ lines.—The anterior margin of the clypeus and the mandibles yellow, the latter ferruginous at their tips; the antennæ ferruginous beneath, above black; the face has a silvery pubescence. Thorax black, the tibiæ, tarsi and femora in front, ferruginous, the rest black; the thorax has a hoary pubescence; wings clearer than in the other sex. Abdomen as in the female. B.M.

Var. β. The posterior tibiæ and tarsi fuscous above, and the intermediate and anterior pairs stained behind.

This species is often confounded with *N. furva*, from which it is quite distinct; it is also distinct from the *A. rufocincta* and *A. Sheppardana* of Kirby, as an examination of the typical specimens in the Kirbian collection proves. The species is not rare in the London district; it is also found in Kent, Surrey, Hampshire and Yorkshire.

11. Nomada Roberjeotiana.

N. atra; scutello, pedibus antennisque ferrugineis; abdomine ferrugineo, apice albo, segmentis secundo tertioque macula laterali alba.

Nomada Roberjeotiana, *Panz. Faun. Germ.* 72. 18 ♂, 72. 19 ♀.
Fabr. Syst. Piez. 391. 6.
Schäff. Germ. Zeits. i. 283. 19.
Smith, Zool. ii. 603. 19.
Nyland. Ap. Boreal. p. 178. 7.
Nomada neglecta, *Schäff. Germ. Zeits.* i. 283. 20.

Female. Length 3 lines.—Head and thorax black, the anterior margin of the clypeus, the labrum and mandibles, ferruginous. Thorax: the collar, tubercles, tegulæ, scutellum and postscutellum, ferruginous; the wings subhyaline, their apical margins clouded, the nervures dark ferruginous, becoming bright-red near the base of the wings; the legs ferruginous, the coxæ and trochanters, except their extreme apex, and the femora beneath, black. Abdomen ferruginous: the base black; the third and following segments rufo-piceous, the second

having at its basal margin laterally a rufo-piceous spot; the basal margin of the third segment is ferruginous in the middle; the second segment has on each side a transverse cream-coloured oval macula, the third a narrower and more elongate one; the fifth has a square spot of the same colour; beneath, immaculate. B.M.

Male. Length 3 lines.—Head and thorax black, the anterior margin of the clypeus, the labrum, mandibles and scape in front, yellow; the flagellum ferruginous. Thorax: the collar, tubercles, tegulæ and the scutellum yellow; wings and legs as in the other sex. Abdomen ferruginous, the base black; the second segment has in the centre a rufous angular spot, and two ovate cream-coloured maculæ, pointed within, beyond which the abdomen is rufo-piceous; the third and fourth have interrupted fasciæ, the sixth is entirely cream-coloured.

This species was not known as a British insect until it was discovered near Blackwater, Hants: it is an autumnal species, and was captured on the Ragwort (*Senecio Jacobæa*) in company with *N. Solidaginis*. Mr. Walcott has a specimen of the male captured by Mr. Dale.

12. Nomada armata.

N. atra; scutello punctis duobus, linea transversa subtus, antennis pedibusque ferrugineis; abdomine rufo, segmentis intermediis maculis flavis.

Nomada armata, *Schäff. Germ. Zeits.* i. 279. 10.
Smith, Zool. vii. *Append.* 41.
Nomada Kirbii, *Steph. Illus. Brit. Ent. Mand.* vii. t. xliii. f. 1 ♂.
Nomada cincticornis, *Nyland. Ap. Boreal.* p. 182. 12 ♀.

Female. Length 5½ lines.—Head and thorax black: the anterior margin of the clypeus, the mandibles and antennæ, and sometimes a minute dot above the eyes, ferruginous; the scape fuscous, the flagellum has the eighth and three following joints fuscous, the apical joint ferruginous; a minute acute tooth in the centre of the labrum. Thorax: a narrow line on the collar, the tubercles, the tegulæ, two spots on the scutellum, and the post-scutellum, ferruginous; a patch beneath the wings and the margin of the metathorax fringed with silvery white pubescence; the legs ferruginous, the coxæ and trochanters, except their extreme apex, and all the femora towards their base beneath, black; the basal joint of the posterior tarsi fuscous on

the outside. Abdomen ferruginous, the base black; the second segment has on each side an ovate yellow macula, and the third and fourth segments a short transverse line on each side at their basal margins. B.M.

Male. Length 5½ lines.—Head and thorax black, the flagellum ferruginous, its two apical joints having a black spot above; the mandibles yellow, their tips ferruginous; the labrum armed with a sharp tooth in the middle; the face covered with silvery white pubescence. Thorax: the pubescence on the disk yellowish, that on the sides and beneath, hoary; the tubercles, tegulæ, tibiæ and tarsi, ferruginous; the femora at their apex above, ferruginous; the wings subhyaline, and having a fuscous cloud at their apical margins. Abdomen ferruginous, its base black; the second segment has on each side a large ovate yellow macula, and the following segments a yellow line at their basal margins; the fifth and sixth have sometimes a transverse band; beneath, the intermediate segments have sometimes a transverse interrupted yellow line, and the three apical ones a central black dot. B.M.

Of this large and conspicuous species there are examples of both sexes in the British Museum, one of which was formerly in the collection of Mr. James Francis Stephens, who no doubt obtained it from Dr. Leach, who first captured the insect in Devonshire. Mr. Samuel Stevens captured a male some four or five years ago in Devonshire, and Mr. Dossetor several of both sexes last year in Wales.

13. Nomada rubra.

N. atra; mandibulis flavis; scutelli punctis ferrugineis; abdomine ferrugineo, immaculato.

Nomada rubra, *Smith, Zool.* vii. *Append.* p. 41 ♀; *Cat. Acul. Hym.* p. 87. 15.

Female. Length 4½ lines.—Ferruginous; the mandibles yellow; a spot at the base of the antennæ, the tips of the scape above and the cheeks black, a line behind the eyes, ferruginous. Thorax: the tubercles yellow; the disk and the metathorax black; a line over the tegulæ, the scutellum, and post-scutellum ferruginous; the sides of the metathorax and the posterior coxæ, which are black, clothed with silvery pubescence; the abdomen ferruginous, immaculate, the apical segment fringed with silvery pubescence. B.M.

The unique specimen of this species is in the British Museum ; it was captured by Dr. Leach at Kingsbridge, Devonshire.

14. Nomada furva.

N. atra ; scutello ferrugineo ; abdomine piceo, rufo cincto. *Mas*, abdomine atro, flavo-maculato.

Nomada furva, *Panz. Faun. Germ.* 55. 25 ♂.
St. Farg. Hym. ii. 495. 27 ♂ ♀.
Smith, Zool. ii. 599. 13 ♂ ♀.
Apis rufo-cincta, *Kirby, Mon. Ap. Angl.* ii. 216. 32 ♀.
Apis Sheppardana, *Kirby, Mon. Ap. Angl.* ii. 217. 33 ♀.
Nomada minuta, *Fabr. Syst. Piez.* p. 394. 19 ♀.
Schäff. Germ. Zeits. i. 278. 7.
Nomada Dalii, *Curtis, Brit. Ent.* ix. t. 419 ♂.

Female. Length 2 lines.—Head and thorax black, the anterior margin of the clypeus, the labrum, mandibles and orbits of the eyes ferruginous ; the antennæ ferruginous beneath, the apical joint entirely so ; the extreme base of the flagellum ferruginous. Thorax : the collar, tubercles, tegulæ, a large lunate spot beneath the wings and a dot above uniting with it, a spot behind the wings, two larger ones on the scutellum, and the post-scutellum, ferruginous ; the wings subhyaline, and having a dark fuscous cloud at their apical margins ; the legs rufo-piceous, the apex of the joints and the tarsi ferruginous. Abdomen rufo-piceous, the first and second segments having a ferruginous band, the apex ferruginous ; the band on the basal segment having two black dots ; sometimes two pale spots on the third segment. (*A. rufocincta*, Kirby.) B.M.

Var. *β*. The basal segment only having an obscure ferruginous band. (*A. Sheppardana*, Kirby.)

Male. Length 2 lines.—Head and thorax black : the margin of the clypeus narrowly, the labrum and a spot on the mandibles towards their apex reddish-yellow ; two fuscous spots on the labrum, the tips of the mandibles ferruginous ; the tips of the scape beneath and the flagellum beneath, reddish-yellow, the apical joint entirely so ; a minute yellow spot at the vertex of the eyes. Thorax : the tubercles and tegulæ ferruginous ; the sides of the metathorax have a little silvery pubescence ; the legs rufo-piceous, their joints pale, as well as the anterior femora and tibiæ in front ; wings as in the female. Abdomen black, the basal segment having two minute dots about the middle, the second a line or dot on each side, and the third

having sometimes a narrow line on each side at its basal margin, yellow; beneath, immaculate. B.M.

This little bee is abundant and very widely distributed; it is parasitic on several species of *Halictus*, and also upon *Colletes*. I find it every season with a colony of *Halictus morio*; it varies a good deal in the colouring, and has received various names in consequence; it may be found during the months of April and May.

15. Nomada mistura.

N. atra; abdomine rufo-fasciato, maculis sulphureis obscuris notato.

Male. Length 3½ lines—Black; the mandibles ferruginous, a spot at their base and the margins of the clypeus yellow; the labrum has a minute tooth in the centre; the antennæ ferruginous beneath, the three or four apical segments entirely so; the scape black. Thorax: a spot on each side of the collar and the tubercles yellow; the apex of the femora, the tibiæ and tarsi yellowish; the anterior and intermediate tibiæ have a dark stain above, the posterior pair black, except their base and apex; the wings subhyaline, their apical margins clouded, the tegulæ and nervures ferruginous. Abdomen: the apical margin of the basal segment ferruginous, a band of the same colour across the middle of the following segments; the second and third have on each side an oblong angulated yellow macula, the third a smaller one at the sides, and the following a transverse yellow stripe; beneath, having more or less bright ferruginous bands.

When this species was described, I had only seen the unique specimen which was captured by Mr. Hewitson; subsequently a second was taken in Yorkshire, and two others were sent for examination by Mr. Heysham, captured near Carlisle; the female is not at present known.

16. Nomada Fabriciana.

N. atra; antennis rufis, nigro annulatis; abdomine ferrugineo, maculis duabus flavis. *Mas*, abdomine ferrugineo, maculis quatuor flavis.

Apis Fabriciana, *Linn. Syst. Nat.* i. 955. 17 ♀.
Rossi, Faun. Etrus. Mant. no. 324.

Nomada Fabriciana, *Fabr. Ent. Syst.* ii. 348. 10.
Spin. Ins. Lig. i. 152. 4.
Schäff. Germ. Zeits. i. 277. 6.
Smith, Zool. ii. 598. 11 ♂ ♀.
Nyland. Ap. Boreal. p. 183. 14.
Apis Fabriciella, *Kirby, Mon. Ap. Angl.* ii. 213. 29 ♀. t. 16. f. 3.
Apis notata, *Kirby, Mon. Ap. Angl.* ii. 14. 30 ♂.
Nomada quadrinotata, *St. Farg. Hym.* ii. 494. 26.

Female. Length 3½–5 lines.—Head and thorax black; the antennæ rufous, four or five joints towards the apex, black; the apical one red; the scape and one or two of the basal joints of the flagellum black above; the apex of the mandibles ferruginous; the face and cheeks have a silvery pubescence. Thorax: the tegulæ, tibiæ in front, the femora at their apex in front, and the apical joints of the tarsi, ferruginous. Abdomen ferruginous, the base black, the second segment has on each side an ovate macula, and the third a minute one, yellow; the margins of the apical segments, piceous. B.M.

Var. β. The third segment immaculate.

Var. γ. The spot on the second segment minute, that on the third obsolete.

Male. Length 3½–4 lines.—Head and thorax black, having a thinly scattered hoary pubescence; the face clothed with silvery pubescence; the antennæ obscurely rufo-piceous beneath; the anterior and intermediate femora at their apex in front, their tibiæ in front, and the tarsi, ferruginous; the basal joints of the latter black or fuscous above. Abdomen ferruginous, the base black; the second and third segments have on each side a round yellow macula, the latter pair smallest. B.M.

This species appears to be generally distributed over the country, but it seldom occurs in large numbers; it is frequently met with on Hampstead Heath about the end of April and during May; it has also been taken in Yorkshire, in the month of July.

17. Nomada Germanica.

N. atra; antennis, pedibus abdomineque ferrugineis, maculis atris.

Nomada Germanica, *Panz. Faun. Germ.* 72. 17 ♀.
Fabr. Syst. Piez. 394. 18.
St. Farg. Hym. ii. 477. 13.
Apis ferruginata, *Kirby, Mon. Ap. Angl.* ii. 218. 34. t. 16. f. 4 ♂ (nec *Linn.*).

Nomada stigma, *Fabr. Syst. Piez.* p. 393. 11?
Nomada ferruginata, *Schäff. Germ. Zeits.* i. 275. 1.
Brullé, Explor. Sc. de Morée, iii. 346. 764.
Smith, Zool. ii. 600. 14.
Nyland. Ap. Boreal. p. 183. 13.
Nomada pleurosticta, *Schäff. Germ. Zeits.* i. 276. 2.

Female. Length 4 lines.—Head and thorax black; the mandibles and antennæ ferruginous, the latter fuscous above; the labrum has a minute acute tooth in the middle. Thorax: the collar on each side, the tegulæ, two spots on the scutellum and the post-scutellum, ferruginous; the wings subhyaline, and having a dark fuscous cloud on their apical margins; the legs ferruginous, the femora beneath more or less black towards their base; the tibiæ have a black spot in front near their apex; the basal joint of the posterior tarsi black; a short silvery-white pubescence on the sides of the metathorax and beneath. Abdomen ferruginous, the base black; a black spot at the basal margins of the second and third segments laterally, the fourth and fifth have a black band, the latter usually interrupted, sometimes obsolete; beneath, having a row of black spots down the middle. B.M.

Male.—Very similar to the other sex, but differs in having a more dense silvery pubescence on the face, the sides of the thorax, and also on the sides of the abdomen, and in having the scutellum black; two or three of the basal joints of the flagellum are swollen and thicker than the apical joints. B.M.

This is a very local species, but will usually be found where colonies of *Andrena fulvescens* are met with, being parasitic on that bee; it occurs sparingly on Hampstead Heath during the month of June, and at Hawley Green, Hants, in profusion.

18. Nomada atrata.

N. tota atra; abdominis basi ferrugineo obscure notata.

Nomada atrata, *Smith, Zool.* iv. 1568.

Male. Length 3½ lines.—Black; the face has a silvery-white pubescence, the mandibles ferruginous, the flagellum obscure rufo-piceous beneath. Thorax: the tubercles and tegulæ, obscure ferruginous; the anterior and intermediate femora towards their apex in front, their tibiæ in front, and the posterior pair at their base, ferruginous; the tarsi ferruginous, stained with fuscous above; wings subhyaline, their apical margins clouded. Abdomen: the second segment obscurely ferruginous, or only

slightly so at the sides; the sides have a short silvery pubescence, as well as the margins of the segments beneath.

This species most closely resembles *N. Germanica*, but its antennæ are shorter, and the basal joints of the flagellum are not swollen; the second submarginal cell is narrower and of a different form.

Two specimens of this species were taken at Arundel, in Sussex, by Mr. S. Stevens; no other locality is known, nor have any other examples been received.

19. Nomada Solidaginis.

N. atra: antennis basi ferrugineis; scutello, abdominisque maculis fasciisque flavis; segmento primo immaculato.

Nomada Solidaginis, *Panz. Faun. Germ.* 72. 18.
Spin. Ins. Lig. fasc. i. 152. 3.
Schäff. Germ. Zeits. i. 284. 23.
St. Farg. Hym. ii. 472. 8.
Smith, Zool. ii. 595. 8.
Nyland. Ap. Boreal. p. 176. 3.
Apis solidaginis, *Kirby, Mon. Ap. Angl.* ii. 204. 22.
Apis picta, *Kirby, Mon. Ap. Angl.* ii. 206. 23 ♀ (var.).
Apis rufo-picta, *Kirby, Mon. Ap. Angl.* ii. 207. 24 (var.).

Female. Length 3¼–4 lines.—Head and thorax black; the clypeus, and a narrow line on each side touching the eyes, the labrum and mandibles, yellow, the tips of the latter ferruginous; the scape and the base of the flagellum ferruginous in front. Thorax: the collar, tubercles, a lunate patch on the breast, the tegulæ and scutellum, yellow; the legs ferruginous, the posterior femora having a dark stain at their base within; the wings pale fulvo-hyaline, faintly clouded at their apical margins. Abdomen: the second and third segments have a large yellow macula acute within, the fourth has a fascia, and the fifth segment is entirely of the same colour; the base of the latter sometimes black; the intermediate segments beneath have transverse yellow fasciæ, sometimes interrupted. B.M.

Var. β. Abdomen rufous, similarly maculated to the former (*A. rufo-picta*, Kirby).

Var. γ. Abdomen rufous, the fascia on the fourth segment widely interrupted (*A. picta*, Kirby).

Male. Length 3½–4 lines.—Black; the clypeus, sides of the face, the labrum, mandibles, and the scape in front yellow; the face has a silvery-white pubescence; the flagellum rufo-testa-

ceous beneath. Thorax: the collar, tubercles, a lunate spot beneath them, the tegulæ, and scutellum yellow; the legs pale ferruginous, the anterior and posterior coxæ yellow in front; the intermediate pair have usually a minute spot at the sides, and another on the pectus in front of each; the posterior femora black at their base, the anterior and posterior pairs usually rufo-testaceous, but sometimes black, the tibiæ and tarsi varied with yellow; the wings subhyaline, their apical margins faintly clouded. Abdomen: the second and third segments have on each side a large transverse macula, pointed within; the fourth and fifth a transverse fascia, attenuated in the middle, the sixth an entire broad yellow one. B.M.

Var. β. The band on the fourth segment interrupted.

Var. γ. The basal segment having two minute yellow dots.

This is one of the most abundant species of the genus; it is somewhat local, usually appears towards the middle of July, and is found in great numbers on the Ragwort, but has been met with in greater abundance on the Wild Thyme. The female is subject to very great variation in colouring: the male seldom offers any striking differences; many hundreds have been examined, but not a single example with the rufous colouring on the abdomen has been discovered. A series of gradual changes from black to red may be met with in specimens of the female. This species is parasitic on *Halictus abdominalis*.

20. Nomada Jacobææ.

N. atra; pedibus ferrugineis, scutelli punctis duobus, abdominisque maculis fasciisque flavis.

Nomada Jacobææ, *Panz. Faun. Germ.* 72. 17 ♂.
Latr. Hist. Nat. xiv. 50. 2.
Schäff. Germ. Zeits. i. 286. 21.
St. Farg. Hist. Nat. Ins. ii. 479. 15.
Smith. Zool. ii. 594. 7 ♂ ♀.
Nyland. Ap. Boreal. p. 175. 2.
Nomada interrupta, *Panz. Faun. Germ.* 96. 22 (var. ♂)?
Apis Jacobææ, *Kirby, Mon. Ap. Angl.* ii. 201. 20 ♂.
Apis flavo-picta, *Kirby, Mon. Ap. Angl.* ii. 202. 21 ♀.

Female. Length 4–4½ lines.—Black; the anterior margin of the clypeus more or less yellow; the labrum and mandibles yellow; the tips of the mandibles and the margin of the clypeus narrowly ferruginous; the labrum has a minute tooth in the

middle; the scape and the base of the flagellum ferruginous beneath. Thorax: the collar, tubercles, a spot on the breast, the tegulæ, and two spots on the scutellum, yellow; the wings subhyaline, their margins clouded; the legs ferruginous varied with yellow; the coxæ and trochanters black, their tips ferruginous; the intermediate and posterior coxæ, yellow in front. Abdomen: the first segment has a subinterrupted fascia, the second a large macula on each side, acute within, the third a narrow line on each side, and the following segment a broad fascia, yellow; the apical segment yellow. B.M.

Male.—This sex closely resembles the female, but the clypeus is usually more yellow, and the scape yellow in front; the abdomen has its bands more interrupted. B.M.

Var. β. Abdomen having all the bands, except the apical one, interrupted; this is probably the *Nomada interrupta* of Panzer.

This species is rare in the vicinity of London, but is not uncommon in some districts, and has been met with about Charlton and Weybridge, in the month of August, on the Ragwort.

21. Nomada lineola.

N. atra, antennis ferrugineis: scutelli punctis duobus flavis; abdominis basi ferrugineo-maculata, fasciisque flavis variegata; labio subcornuto.

Nomada lineola, *Panz. Faun. Germ.* 52. 23 ♀.
St. Farg. Hym. ii. 486. 20.
Apis cornigera, *Kirby, Mon. Ap. Angl.* ii. 190. 11 ♀.
Apis subcornuta, *Kirby, Mon. Ap. Angl.* ii. 192. 12 ♀.
Apis capræ, *Kirby, Mon. Ap. Angl.* ii. 193. 13 ♀.
Apis lineola, *Kirby, Mon. Ap. Angl.* ii. 194. 14.
Apis sexcincta, *Kirby, Mon. Ap. Angl.* ii. 198. 17 ♂.
Nomada cornigera, *St. Farg. Hym.* ii. 481. 16 ♀.
Smith, Zool. ii. 591. 4 ♂ ♀.

Female. Length 4–6 lines.—Black; a line along the lower portion of the inner orbits of the eyes, the anterior margin of the clypeus, the labrum, mandibles, and antennæ, ferruginous; the scape has sometimes a yellow stain beneath and the flagellum is slightly fuscous towards the apex. Thorax: the collar, tubercles, tegulæ, and two spots on the scutellum, yellow; the legs ferruginous, the knees stained with yellow; the femora at their base beneath and the coxæ and trochanters more or less black; the posterior femora black within; the breast has a ferruginous spot on each side; the wings subhyaline, their

apical margins clouded, the nervures ferruginous. Abdomen: the basal segment having a ferruginous fascia, the second a large yellow macula on each side, acute within, the third a narrower macula, the fourth a transverse fascia, the fifth, except its extreme base, yellow; beneath, ferruginous, the apical margins of the segments black, the fourth having a central yellow spot, sometimes the third and fourth also. B.M.

Var. β. The basal segment of the abdomen having two ferruginous spots.

Var. γ. The anterior margin of the ferruginous line on the basal segment yellow; beneath variegated with yellow.

Var. δ. The ferruginous fascia having two yellow spots.

Var. ϵ. The ferruginous fascia having a transverse subinterrupted yellow line.

Var. ζ. The tegulæ more or less ferruginous, the red fascia obscure, and having two black dots.

Male. Length 4–5 lines. — Black; the face has a silvery-white pubescence, that on the vertex and disk of the thorax pale fulvous; the scape in front, the anterior margin of the clypeus, the labrum and mandibles, yellow; the flagellum ferruginous, three or four of the basal joints fuscous above. Thorax: the tubercles and tegulæ, also sometimes two minute dots on the scutellum, yellow; beneath, as well as the coxæ and femora covered with a hoary pubescence; the femora, tibiæ and tarsi ferruginous, the former black at their base beneath, and the posterior pair also black within; wings as in the other sex. Abdomen: the three basal segments having interrupted yellow fasciæ, the three apical fasciæ uninterrupted, the seventh segment, yellow; the fascia on the fourth segment attenuated in the middle: the three basal segments have the lateral yellow stripes more or less pointed within; beneath, the segments have transverse broad yellow stripes. B.M.

Var. β. The apical margin of the basal segment of the abdomen ferruginous, and having two yellow spots.

The female varies greatly in the distribution of the colouring of the abdomen. The varieties include four of Mr. Kirby's species: nothing but an extensive series could justify any one in thus reducing the species, but the insect having been plentiful for some years on Hampstead Heath, the above varieties have been obtained. The male seldom varies: Var. β. is very rare. The male is apt to be confounded with that of *N. alternata*, and it is indeed difficult at first to separate them: the male of *N. lineola* has its legs variegated with yellow, its tegulæ sulphur-yellow, while its antennæ are rather thicker and fuscous towards

the base. The name "*cornuta*," which Mr. Kirby gave to this species, was not a happy one, since that characteristic is common to several of the species. This bee is usually found from the middle of April to the end of May, but it is not one of the early species; some years it is not found before the middle of May.

22. Nomada alternata.

N. atra; antennis tegulisque ferrugineis; scutelli punctis, abdominisque fasciis flavis, tribus anticis interruptis.

Apis alternata, *Kirby, Mon. Ap. Angl.* ii. 185. 5 ♂.
Apis Marshamella, *Kirby, Mon. Ap. Angl.* ii. 188. 10 ♀.
Nomada Marshamella, *Schaff. Germ. Zeits.* i. 285. 25.
Smith, Zool. ii. 590. 3.

Female. Length 4–5 lines.—Black; the anterior margin of the clypeus, the labrum, mandibles and antennæ, ferruginous. Thorax: the collar on each side, the tubercles, and two spots on the scutellum, yellow; the tegulæ and legs ferruginous; the coxæ and femora towards their base, and the posterior femora within, black; the wings subhyaline, their apical margins clouded, the nervures ferruginous. Abdomen: two spots on the basal segment, an interrupted fascia on the two following, on the fourth an entire fascia, and on the fifth a large quadrate spot, yellow; there is usually a minute spot on each side of the quadrate one; beneath, the third and fourth segments have usually a yellow fascia and the second sometimes two minute dots. B.M.

Var. β. The basal segment of the abdomen immaculate, and the spots on the scutellum reddish-yellow.

Male. Length 3½–5 lines.—This sex very closely resembles the female, but has the scape in front, the anterior margin of the clypeus, the labrum and mandibles, yellow; the face has also a silvery-white pubescence; the tubercles and two minute spots on the clypeus, yellow; the tegulæ ferruginous, sometimes dashed with yellow; the wings and legs as in the other sex; the fasciæ on the abdomen are broader, the three first subinterrupted; beneath, the second and three following segments have broad yellow fasciæ, the first usually interrupted, the apical segment yellow. B.M.

Var. β. The basal segment of the abdomen immaculate.

Var. γ. The spot on the scutellum obsolete (*alternata*, Kirby).

This is one of the most abundant species of the genus; it is found in all parts of Great Britain, and is not subject to great

variation in colouring; it appears early in spring, and is sometimes taken the first week in April, and usually throughout May, but if the weather is mild it may be found occasionally towards the end of March. I have twice met with this species in autumn, one specimen at Shirley, September 15th, 1848, another September 10th, 1853: these are, of course, deviations from the usual habit of the species: the extreme beauty of the weather, like a second spring, having tempted them from their hibernacula.

23. Nomada sexfasciata.

N. atra; scutelli punctis duobus, abdominis segmentis tribus basalibus flavo-maculatis, segmentis alteris flavo-fasciatis. *Mas,* pedibus flavis.

Nomada sexfasciata, *Panz. Faun. Germ.* 62. 18 ♂.
Schäff. Germ. Zeits. i. 285. 24.
St. Farg. Hym. ii. 471. 7.
Lucas, Explor. Sc. Algér. iii. 218. 155.
Smith, Zool. ii. 593. 6 ♂ ♀.
Apis Schæfferella, *Kirby, Mon. Ap. Angl.* ii. 199. 18 ♀.
Apis connexa, *Kirby, Mon. Ap. Angl.* ii. 199. 19 ♂.

Female. Length 6 lines.—Black; the anterior angles of the face, the margin of the clypeus, the labrum and mandibles, yellow; the two latter more or less ferruginous; the antennæ ferruginous, the scape more or less black behind. Thorax: the tubercles, tegulæ, and two spots on the scutellum, yellow; the disk slightly and the metathorax more densely covered with pale fulvous pubescence; wings subhyaline, the apical margins having a fuscous cloud, the nervures ferruginous; the legs ferruginous, the tibiæ yellowish towards their base, the coxæ and trochanters black. Abdomen: the three basal segments having on each side a yellow spot, those on the second and third segments pointed within; the fourth and fifth have interrupted fasciæ; beneath, the third and fourth segments have a transverse yellow dash. B.M.

Male. Length 6 lines.—Closely resembling the other sex, but having those parts of the mouth yellow which are ferruginous in the female; the scape yellow in front, black behind, and five or six of the basal joints of the flagellum black above. Thorax: thinly clothed above with hoary pubescence, beneath more densely so, the legs yellow, and having in parts faint ferruginous stains; the femora beneath more or less black, the posterior pair black within. Abdomen variegated with yellow

fasciæ as in the other sex, but the fasciæ not quite so widely interrupted. B.M.

Var. β. The basal segment of the abdomen immaculate.

This is a very local species, parasitic on *Eucera longicornis*, probably it will be found wherever colonies of that bee are met with; it occurs at Southgate in plenty, infesting *Eucera*. I have not seen any specimens from the north of England.

24. Nomada succincta.

N. atra; tegulis, tuberculis, scutellique punctis, flavis; abdomine fasciis flavis nigrisque alternis ornato.

Nomada succincta, *Panz. Faun. Germ.* 55. 21.
Schäff. Germ. Zeits. i. 287. 30.
St. Farg. Hym. ii. 469. 6.
Nyland. Ap. Boreal. p. 175. 1.
Apis Goodeniana, *Kirby, Mon. Ap. Angl.* ii. 180. 4.
Nomada Goodeniana, *Smith, Zool.* ii. 589. 1.

Female. Length 4–5 lines.—Black; the anterior margin of the clypeus, the labrum, mandibles, and antennæ, ferruginous; the inner orbits of the eyes, as high as the insertion of the antennæ, yellow. Thorax: the collar, tubercles, tegulæ, two spots on the scutellum, one on the post-scutellum, and a dot on each side of the metathorax, yellow; the legs ferruginous; the coxæ, trochanters, femora beneath at their base, the posterior pair also within, black. Abdomen: each segment having a yellow fascia, the first usually interrupted, the two following attenuated in the middle. B.M.

Male.—Very closely resembling the female, but having the clypeus anteriorly, the sides of the face, the scape in front, the labrum and mandibles, yellow; the latter ferruginous at their tips; the scape black above, and the four or five basal joints of the flagellum having a black spot above; the head and thorax have a thin hoary pubescence; the anterior coxæ, the tibiæ in front, a spot on each side of the breast in front, yellow; wings subhyaline, the nervures pale ferruginous, the apical margins faintly clouded as in the other sex; the abdomen as in the female. B.M.

This is a very abundant species, found in all parts of Great Britain; it is not subject to vary in its markings, but sometimes the legs are dashed with yellow, particularly at the knees; sometimes the post-scutellum is black; the fascia on the basal segment of the abdomen is also occasionally entire.

Genus 3. EPEOLUS.

Apis, pt., *Linn. Syst. Nat.* i. 953 (1766).
Nomada, pt., *Fabr. Ent. Syst.* ii. 345 (1793).
Epeolus, *Latr. Gen. Crust. et Ins.* iv. p. 171 (1809).

Head transverse, the ocelli placed in a curve on the vertex; the labrum transverse-ovate, the anterior margin sub-emarginate, with a minute tooth in the centre of the emargination, the angles produced; in the middle, two minute teeth placed in a line with the angles of the emargination. The labial palpi four-jointed, about one-fifth shorter than the labium; the two basal joints elongate, the first joint one-third longer than the second, the two apical joints minute, placed at the apex of the second joint; the paraglossæ short and lanceolate. The maxillary palpi one-jointed, the joint ovate and minute. The superior wings having one marginal and three submarginal cells, the marginal cell elongate-ovate, slightly narrowed towards the apex; the first submarginal cell nearly as long as the two following, the second much narrowed towards the marginal, and receiving the first recurrent nervure a little beyond the middle; the second submarginal also much narrowed towards the marginal cell, and receiving the second recurrent nervure a little beyond the middle. The legs have the calcaria and claws simple. Abdomen oblong-cordate.

1. Epeolus variegatus.

E. niger; thorace abdomineque albido-variegatis; pedibus ferrugineis.

Apis variegata, *Linn. Faun. Suec.* p. 422. no. 1690; *Syst. Nat.* i. 957. 24 ♂.
Kirby, Mon. Ap. Angl. ii. 222. 36. t. 16. f. 6 ♀.
Don. Brit. Ins. xii. 10. t. 399. f. 2.
Nomada variegata, *Fab. Syst. Ent.* p. 389. 2; *Ent. Syst.* ii. 347. 5.
Epeolus variegatus, *Latr. Hist. Nat.* xiv. 49. 2.
Fabr. Syst. Piez. p. 388. 1.
Jurine, Hym. t. 14. f. 5.
Curtis, Brit. Ent. ii. t. 516.
Blanch. Hist. Nat. Ins. p. 412.
St. Farg. Hym. ii. 462. 2. t. 17. f. 5 ♀, 6 ♂.
Guérin, Icon. Règ. Anim. Ins. 454. t. 74. f. 1.
Smith, Zool. iii. 1150. 1.
Nyland. Ap. Boreal. p. 174. 1.

Female. Length 3½–4 lines.—Black; the face clothed with short silvery-white pubescence, the labrum and mandibles ferruginous, the former having usually a dark stain on each side at the base; the flagellum ferruginous at the base beneath. The collar covered with yellowish-white pubescence, and two abbreviated lines emanating from it in the middle; the scutellum, tubercles, tegulæ and legs, ferruginous; a large patch of short white pubescence beneath the wings, and a spot behind the tegulæ; the sides and base of the metathorax variegated with white pubescence; on each side of the scutellum a broad angular tooth; the wings subhyaline, their margins faintly clouded. Abdomen: an interrupted white band at the basal and apical margins of the first segment, uniting at the lateral margins; the second, third and fourth segments have on each side a broad line of white pubescence, that on the third and fourth attenuated in the middle, or interrupted; the fifth has a spot in the middle and another on each side; beneath, ferruginous towards the base, and the margins of the three apical segments with bands of white pubescence. B.M.

Var. β. The femora more or less rufo-testaceous.

Male.—This sex only differs from the female in having the labrum usually and the scutellum always black; the coxæ, trochanters, and base of the femora, are usually black. B.M.

This pretty little bee is very abundant in many parts of Kent, Surrey, and Hampshire; it is also met with at Southend in Essex; it is however local; wherever *Colletes Daviesana* is found, *Epeolus*, its parasite, is to be met with; it has been found in the burrows of that bee. It usually appears early in July; the males pass a great portion of their time reposing in flowers, particularly on the heads of the Ragwort; they are also partial to the Mouse-ear Hawkweed, and may frequently be found enclosed in the petals of the flowers; the habit of this bee is very sluggish, they are easily captured by hand, their sting is very acute.

Genus 4. CŒLIOXYS.

Apis, pt., *Linn. Faun. Suec.* p. 419 (1761),
Anthophora, pt., *Fabr. Syst. Piez.* p. 372 (1804).
Megachile, pt., *Latr. Hist. Nat.* 53. sec. 3 (1805).
Cœlioxys, *Latr. Gen. Crust. et Ins.* iv. 166 (1809).

Head as wide as the thorax; the ocelli placed in a triangle on the vertex; the eyes lateral, elongate, and covered with pubescence. The labial palpi four-jointed, the two basal joints elon-

gate, the second rather longer than the first, the third and fourth minute, placed at the side and near the apex of the second joint. The maxillary palpi three-jointed, the basal joint very short, thick and subglobose; the second joint not so thick, but of about the same length; the apical joint of equal length, but slender and cylindric. The labrum elongate, transverse at the base and produced at the lateral angles. Thorax globose, the scutellum armed with a tooth on each side; the superior wings with one marginal and two submarginal cells; the marginal cell narrow, elongate, and rounded at the apex; the second submarginal cell receiving the two recurrent nervures, the first near its base, and the second near its apex. Abdomen conical, acute at the apex in the females; in the males the apex is dentate. The claws simple in the females; in the males bifid at their apex. The males have their anterior coxæ toothed.

The bees belonging to the genus *Cœlioxys* are parasitic upon those of the genera *Megachile* and *Saropoda*; from cocoons of *M. circumcincta* Mr. Waterhouse obtained a species of *Cœlioxys* in the year 1835. I have frequently bred *C. simplex* from the cocoons of the same bee, and *C. rufescens* from those of *M. Willughbiella*. Some years ago I found a species of *Cœlioxys* in the cells of *Saropoda*; it was new to the British list, and described under the name of *C. umbrina*; the individuals found in the cells were clothed with pale yellowish-brown pubescence; when once exposed to the sun this colour becomes cinereous. The species occurs in profusion in Sandown Bay, Isle of Wight, where *Saropoda bimaculata* also abounds. *Cœlioxys Vectis* is also very abundant in the same locality.

The species of this genus are difficult to determine; hitherto three have been commonly associated as one. Dr. Nylander has adopted an excellent distinctive specific character; I have availed myself of it in the discrimination of the British species; it must, however, be admitted, that excellent as the character alluded to undoubtedly is, yet we must not forget, that a species is not as it were cast in a mould, but admits of a degree of variety, still however retaining intact the broad and distinguishing characteristic. The distinctive specific character employed, is the form of the plates of the apical segment of the abdomen, the inferior plate being not only of a different form in the species, but also of a different relative length as compared to the superior plate; in some species the two plates are of nearly the same length, whilst in others the inferior plate is half as

long again as the superior one: this of course only applies to the females—the males have no such marked distinctive differences, and are much more puzzling and difficult to determine; some characters will however be found in the number, form and situation of the teeth which arm the apical segments. The value of the form of the ventral plates as a specific character has been tested by an examination of upwards of three hundred individuals of *C. umbrina*, also of seventy examples of *C. Vectis*: this character appears to be the best hitherto discovered.

1. Cœlioxys quadridentata.

C. atra; scutello utrinque dentato, margine postico obtuse subangulato; abdomine conico, segmentis margine albidis; ano *maris* dentato.

Apis quadridentata, *Linn. Faun. Suec.* 1703; *Syst. Nat.* i. 958. 29, ♂♀ *Cab. Mus. Linn. Soc.*
Fabr. Syst. Ent. p. 386. 49; *Ent. Syst.* ii. 340. 112.
Panz. Faun. Germ. 55. 13.
Apis conica, *Linn. Faun. Suec.* no. 1705; *Syst. Nat.* i. 958. 32, ♂♀ *Cab. Mus. Linn. Soc.*
Anthophora quadridentata, *Fabr. Syst. Piez.* p. 379. 32.
Anthophora conica, *Fabr. Syst. Piez.* p. 380. 33 ♂.
Megachile conica, *Latr. Hist. Nat.* 53. 4.
Cœlioxys conica, *Latr. Gen. Crust. et Ins.* iv. 167?
Zett. Ins. Lapp. p. 468. 1?
Cœlioxys quadridentata, *Smith, Zool.* iii. 1151.
Cœlioxys acuta, *Nyland. Ap. Boreal.* p. 250. 1.

Female. Length 5 lines.—Black; head and thorax roughly punctured, the face with a yellowish-white pubescence, the anterior margin of the clypeus having a dense pale fulvous fringe; the eyes pubescent. Thorax: the posterior margin of the scutellum obtusely angulate and armed on each side with a short tooth; the wings fusco-hyaline, their margins clouded. Abdomen shining, having scattered deep punctures; the apical segment very closely and finely punctured, subopake, and having a slight longitudinal carina, the apex of the segment lanceolate; the ventral plate lanceolate, elongate, produced beyond the superior plate, and having a lanceolate appendage at the apex. B.M.

Male. Length 4½ lines.—Black, punctured as in the other sex, the face having a dense silvery-white pubescence; the thorax as in the other sex; the apical segment of the abdomen produced into two stout bifurcate appendages, having on each side at their base a stout straight acute tooth. B.M.

This species appears to be rare: two specimens were captured in Yorkshire, and a male and female in Hampshire. The Linnæan typical specimen has been very carefully examined, and the form of the ventral plates has been drawn from it. This insect is common, Dr. Nylander informs us, in Denmark and Finland; he described it as a new species in his work on the Northern Bees. Probably it is not uncommon in the north of England; the only examples which I captured when in Yorkshire proved to be the Linnæan species.

2. Cœlioxys simplex.

C. atra; scutello utrinque dente incurvo armato, margine postico subangulato; abdominis segmento apicali elongato, producto, semilanceolato.

Apis conica, *Kirby, Mon. Ap. Angl.* ii. 224. 37. t. 16. f. 7 ♀, 8 ♂.
Cœlioxys simplex, *Nyland. Revis. Ap. Boreal.* p. 279. 6.
Cœlioxys mandibularis, *Nyland. Av. Boreal.* p. 252. 3 (var. ♀?).
Cœlioxys conica, *Curtis, Brit. Ent.* viii. p. 349. 1. f. 6* ♀, 7* ♂.

Female. Length 5 lines.—Black; the head and thorax have a pale fulvous pubescence, the eyes pubescent; the wings fusco-hyaline, their apical margins having a fuscous cloud; the posterior margin of the thorax subangular, armed on each side with a short slightly bent tooth; the abdomen shining, and having large scattered punctures, the apex of the sixth segment closely and finely punctured, subopake, and indistinctly carinated down the centre; the ventral plate elongated, narrow, lanceolate, and produced considerably beyond the upper plate. B.M.

β. Having the mandibles geniculated (var.?).

This species is very widely distributed; it is the most abundant of the genus in the vicinity of London. The male next described probably belongs to it.

3. Cœlioxys sponsa.

C. atra, hirsuto-cinerea; scutello utrinque minute dente incurvo armato, margine postico rotundato; abdominis apice multidentato.

Male. Length 3–4½ lines.—Black; the head a little wider than the thorax, the face having a yellowish-white pubescence, that on the clypeus silvery. Thorax: the posterior margin of the

clypeus rounded, and having on each side a short slightly curved tooth; the apical segment of the abdomen armed at the base on each side with a slender acute spine, the lateral angles of the fifth segment slightly produced; the apex terminating in two bifurcate appendages, the upper tooth of the bifurcation very short and obtuse, the lower tooth more elongate and acute. B.M.

This is very probably the male of *C. simplex*, being equally abundant in the London district.

4. Cœlioxys umbrina.

C. atra; capite thoraceque punctulatissimis, scutello utrinque dente incurvo armato, margine postico rotundato.

Cœlioxys umbrina, *Smith, Zool.* iii. 1153. 4.

Female. Length 4–5 lines.—Black; the pubescence on the face, sides of the thorax, and the fasciæ of the abdomen, yellowish-white; the scutellum rounded posteriorly, and having on each side a short incurved tooth; the wings fusco-hyaline, their apical margins having a broad fuscous cloud. Abdomen shining, the punctures coarse, but not very close; the apical segment has a slight longitudinal carina, the apex is closely punctured, opake, and sublanceolate; the inferior plate produced a little beyond the upper one, its lateral margins nearly parallel, its apex angular. B.M.

Male. Length 3–4 lines.—The head and thorax as in the other sex, the sides of the abdomen slightly curved, the apex divided into two bifurcate processes, the upper teeth being short and obtuse, the lower teeth more elongate and acute; on each side of the segment an acute spine or tooth, and the extreme lateral apical margins of the sixth segment produced into a short tooth. B.M.

This species occurs in the greatest abundance in Sandown Bay, Isle of Wight, in the month of July, in company with *Saropoda bimaculata*. A single specimen of the male was taken some years ago in Hampshire, in the nest of *Saropoda*. When very recently disclosed the pubescence has a yellow tint, but it will usually be found cinereous from exposure.

5. Cœlioxys rufescens.

C. atra, rufo-villosa; scutello utrinque dente incurvo armato, margine postico obtuso angulato; abdomine convexo.

Cœlioxys rufescens, *St. Farg. & Serv. Encycl. Méth.* x. 109.
St. Farg. Hym. ii. 519. 2.
Blanch. Hist. Nat. des Ins. iii. 413.
Smith, Zool. iii. 1152. 3.
Cœlioxys apiculata, *Nyland. Ap. Boreal.* p. 282. t. 3. f. 11 *b*.
Cœlioxys hebescens, *Nyland. Ap. Boreal.* p. 251. 2. t. 3. f. 11 *a*.

Female. Length 6 lines.—Black; the head and thorax coarsely punctured; the face densely covered with short yellow pubescence; that on the thorax is of a paler colour; the posterior margin of the scutellum subangular, and armed on each side with a curved spine or tooth; the wings fusco-hyaline, and having their apical margins clouded. Abdomen shining, conical, convex above and beneath, strongly punctured; an angular patch on each side of the basal segment, the second and three following segments with an entire fascia, which is continued beneath, of pale yellowish-white pubescence; the superior plate of the apical segment lanceolate; the lower plate angular at the apex; the inferior plate not longer than the upper plate. B.M.

Var. β. The apex of the inferior plate angulated and notched at the side, forming an acute appendage at the apex.

Var. γ. The inferior plate obtuse, and rounded at the apex.

Male. Length 4½–5 lines.—This sex agrees with the female in the pubescence and sculpture of the head and thorax; the face has the pubescence perhaps a little longer, more dense, and of a brighter yellow. The abdomen is similarly convex and similarly banded; the apical segment is produced into two bifurcate processes, the upper tooth slightly erected and obtuse, the lower tooth longer and acute; on each side at the base of the segment is a straight acute spine. B.M.

This species has been taken in abundance, and the variety γ. of the female occurs not unfrequently amongst them; this variety is the *C. hebescens* of Nylander. *C. rufescens* closely resembles *C. umbrina*, but it is a larger insect, and the colour of its pubescence is different; some small examples approach large ones of *C. umbrina*, but the ventral plate of the female will be found to differ in form.

6. Cœlioxys Vectis.

C. atra ; capite thoraceque pallido-villosis ; scutello utrinque dentato, margine postico rotundato; abdominis segmentis utrinque macula tomentosa alba ornatis.

Cœlioxys Vectis, *Curtis, Brit. Ent.* viii. t. 349.
Smith, Zool. iii. 1152. 2.
Cœlioxys temporalis, *Nyland. Ap. Boreal.* p. 253. 4.

Female. Length 6 lines. — Black ; head and thorax rugose-punctate ; the face has a pale yellow pubescence, that on the clypeus very short, its anterior margin having a fulvous fringe ; the cheeks and breast have a silvery-white pubescence ; the posterior margin of the scutellum rounded, and armed on each side with a spine. Abdomen shining ; the base has on each side a large quadrate patch, and the third and three following segments have on each side, at their basal margins, an elongate angular spot of white pubescence ; the apical segment sublanceolate, the inferior valve longest, finely punctured, roughened at its apex ; the ventral plate lanceolate ; beneath, the basal segment has a spot of white pubescence in the middle, and the four following segments are fringed with white. B.M.

Male.—Very closely resembling the female, being of the same jet-black colour, and having the abdomen similarly spotted with snow-white pubescence, the apical segment produced, forming two bifurcate projections, the upper teeth scarcely produced, viewed laterally appearing to be acute, the inferior teeth longer and acute ; viewed from above, the upper teeth are rounded at their apex ; on each side of the apical segment is an acute spine, and another at the angles of the fifth segment. B.M.

This very distinct and beautiful species is local. Mr. Curtis first discovered it at Black Gang Chine, in the Isle of Wight, and has given an excellent figure of it in his ' British Entomology.' In 1852, in the beginning of July, it occurred in tolerable abundance in Sandown Bay, Isle of Wight ; it is the parasite of *Megachile maritima*. It has also been found at Little Hampton, Sussex, and in Yorkshire, and has recently occurred at Wimbledon in some numbers.

Genus 5. STELIS.

Apis, pt., *Kirby, Mon. Ap. Angl.* i. 154 (1802).
Megilla, pt., *Fabr. Syst. Piez.* p. 328 (1804).
Stelis, *Panz. Krit. Revis.* ii. (1806).
Megachile, pt., *Latr. Hist. Nat.* xiv. 51 (1805).
Gyrodroma, *Klug, Illig. Mag.* vi. (1807).

Head transverse, the stemmata placed in a triangle on the vertex; antennæ filiform in both sexes. The labial palpi four-jointed, the two basal joints elongate, the basal joint about two-thirds of the length of the second joint, the two apical joints minute. The maxillary palpi two-jointed, the joints minute. The superior wings with one marginal and two submarginal cells, the marginal cell as long as the two submarginals, its apex rounded; the submarginal cells of about equal length, the second receiving the first recurrent nervure a little within; the second recurrent nervure passes a little beyond the apex of the second submarginal cell, and unites with the abbreviated cubital nervure; the legs having the calcaria simple and the claws bifid.

This genus of parasitic bees consists of a small number of species; about eight are at present known, three of which are found in Britain. One species has been observed entering the burrows of *Osmia fulviventris*, and *Stelis minuta* is parasitic on *O. leucomelana*; a specimen was obtained from a bramble-stick containing the nest of *Osmia*. Léon Dufour has also obtained *S. minuta* from bramble-sticks.

1. Stelis aterrima.

S. nigra, punctulatissima; scutello bidentato; abdominis segmentis marginibus decoloratis.

Apis aterrima, *Panz. Faun. Germ.* 56. 15.
Apis punctulatissima, *Kirby, Mon. Ap. Angl.* ii. 231. 39. t. 16. f. 9.
Megilla aterrima, *Fabr. Syst. Piez.* p. 331. 15.
Megachile punctatissima, *Latr. Hist. Nat.* xiv. 54.
Spin. Ins. Lig. fasc. 1. p. 135. 3.
Stelis aterrima, *St. Farg. Hym.* ii. 527. 1.
Smith, Zool. iii. 1154. 1 ♂ ♀.
Nyland. Ap. Boreal. p. 275. 2.

Female. Length 4 lines.—Black, closely and strongly punctured; the head and thorax have a sparing cinereous pubescence; the scutellum rounded behind and armed on each side with a short stout tooth; the wings fusco-hyaline, a dark fuscous stripe traversing the marginal cell, the apical margins also have a fuscous cloud. Abdomen incurved, shining, the apical margins of the segments testaceous; the apical segment subangulate. B.M.

Male.—This sex only differs from the female in having the margin of the apical segment of the abdomen rounded.

This is a scarce insect, only occasionally met with: it has occurred in Hampshire, at Birch Wood, Kent, and at Weybridge; but only one or two specimens at each locality.

2. Stelis phæoptera.

S. atra, punctulatissima, albido subpubescens; ano rectangulo.

Apis phæoptera, *Kirby, Mon. Ap. Angl.* ii. 232. 40 ♀.
Megachile phæoptera, *Latr. Hist. Nat. Ins.* ii. 527. 2.
Spin. Ins. Lig. fasc. 1. 136. 4.
Stelis phæoptera, *St. Farg. Hym.* ii. 527. 2.
Smith, Zool. iii. 1154. 2.
Nyland. Ap. Boreal. p. 274. 1.

Female. Length 4 lines.—Black, closely and strongly punctured; the face, cheeks, thorax on the sides and beneath, having a thin hoary pubescence; the posterior margin of the thorax rounded, the scutellum coarsely punctured, unarmed; wings fusco-hyaline, the apical margins clouded, a darker cloud occupying the marginal cell. Abdomen shining, the apex incurved and pointed, the apical segment subcarinate. B.M.

Male.—Exactly resembling the female, the margin of the apical segment of the abdomen entire. B.M.

This insect has been taken in Battersea Fields, usually in the flowers of the Mallow. The female has been observed entering the burrows of *Osmia fulviventris* in an old post: on one occasion it flew out to a short distance and settled on another post: at this moment the *Osmia* returned and entered the burrow: immediately on her coming out the *Stelis* again re-entered: this proceeding was repeated several times, probably until the cell was properly furnished with food for the parasite.

3. Stelis octomaculata.

S. atra, punctulatissima; abdominis segmentis maculis lateralibus flavis.

Stelis octomaculata, *Smith, Zool.* iii. 1155. 3 ♂ ♀.
Stelis ornatula, *Nyland. Ap. Boreal. Supp.* p. 106 ♀.

Female. Length 3 lines.—Black; head and thorax closely and strongly punctured, the face has a thin silvery-white pubescence, the hinder margin of the vertex subemarginate. Thorax shining, the wings fusco-hyaline, their apical margins clouded; the scutellum slightly produced, subangular, pointed in the middle. The abdomen shining, closely punctured, but not so strongly as the head and thorax; the basal segment has on each side an ovate yellow macula, and the three following an elongate-ovate stripe, pointed within; the apex rotundate.

Male. Length 3 lines.—Closely resembling the female, but differing in having an ovate macula on the two basal segments of the abdomen, the third has a narrow streak on each side, the fourth two spots on each side, and the fifth a single spot.

This species was bred from the nest of *Osmia leucomelana* some years since by Mr. Thwaites; at that time it was believed to be the *Stelis minuta* of St. Fargeau. Subsequently two females were taken by myself at Hawley, Hants, and a single male bred from a bramble-stick containing cocoons of *Osmia leucomelana*; my specimens have been compared with those taken by Mr. Thwaites, and proved to be the same species. In order to ascertain with certainty whether the British species was the *Stelis minuta*, I obtained specimens of that insect from the Continent, and found the British species to be distinct. The most obvious differences in the two species are the following:—*S. octomaculata* has the hinder margin of the vertex nearly straight; the scutellum is subangular, pointed in the middle and slightly produced; the insect is also coarsely punctured. *S. minuta* has the vertex deeply emarginate its entire width; the scutellum is rounded behind, and not produced; the insect is much more finely punctured than *S. octomaculata*.

Dr. Sichel of Paris obligingly furnished the specimens for comparison.

Genus 6. MELECTA.

Apis, pt., *Fabr. Syst. Ent.* p. 378 (1775).
Centris, pt., *Fabr. Syst. Piez.* p. 354 (1804).
Melecta, *Latr. Hist. Nat.* xiv. 48 (1805).
Crocisa, pt., *Jurine, Hym.* p. 239 (1807).
Symmorpha, *Klug, Illig. Mag.* vi. (1807).

Head transverse, the ocelli placed in a line on the vertex; the antennæ filiform, the basal joint of the flagellum most slender at the base. The labial palpi four-jointed, the basal joint thrice the length of the second joint, the two apical joints minute, placed at the side and near the apex of the second joint. The maxillary palpi five-jointed, the basal joint short, stout and ovate, the second, third and fourth, of nearly equal length, the apical joint shorter. The superior wings with one marginal and three submarginal cells; the marginal cell not much longer than the first submarginal cell, rounded at its apex; the second submarginal cell much narrowed towards the marginal, receiving the first recurrent nervure towards its apex; the third submarginal receiving the second recurrent nervure; the third transverse cubital nervure much bent or elbowed towards the apex of the wing. The calcaria of the posterior tibiæ have the inner spine serrated, those on the intermediate tibiæ are simple; the claws of the anterior tarsi bifid.

The two species of the genus *Melecta* which are found in this country are amongst the most conspicuous and elegant of our indigenous bees. The shining jet spotted with snow-white which adorns the type, *M. luctuosa*, cannot fail to excite our admiration. *Melecta* is the parasite of *Anthophora*; I have frequently bred it from the cells of that bee. In the autumn of 1852 a large number of larvæ from the nests of *Anthophora* were obtained; no difference of form could be detected amongst them, but some were of an orange-yellow, and others white: all the yellow larvæ proved to be those of *Anthophora*, and some of the pale-coloured specimens those of *Melecta*. These bees are frequently infested with the larvæ of *Meloë*; sometimes as many as a dozen may be observed adhering to the sides of the metathorax of a single individual.

1. Melecta luctuosa.

M. aterrima, albido-villosa; abdominis segmentis utrinque puncto subquadrato niveo ornatis.

Apis luctuosa, *Scop. Ann. Hist. Nat.* iv. p. 9.
Schrank, Ins. Aust. p. 404. 816.
Rossi, Faun. Etrusc. ii. 105. 918.
Apis punctata, *Fabr. Syst. Ent.* p. 385. 43; *Ent. Syst.* ii. 337. 99.
Panz. Faun. Germ. 35. 23 ♀.
Melecta punctata, *Latr. Hist. Nat. Ins.* xiv. 48.
Fabr. Syst. Piez. 387. 7.
Spin. Ins. Lig. fasc. i. 153. 3.
Brullé, Expéd. Sc. de Morée, p. 342. 757.
Blanch. Hist. Nat. Ins. 411. t. 6. f. 8.
St. Farg. Hym. ii. 441. 1.
Lucas, Explor. Sc. Algér. iii. 211. 145.
Melecta notata, *Illig. Mag.* v. 99. 2.
Symmorpha punctata, *Klug, Illig. Mag.* vi. p. 227.
Melecta Atropos, *Newm. Ent. Mag.* ii. 514. 6 ♂.
Smith, Zool. iii. 1149. 2 ♂ ♀.
Melecta Lachesis, *Newm. Ent. Mag.* ii. 514. 5 ♀.

Female. Length 6 lines.—Jet-black, shining; the clypeus covered with snow-white pubescence, on the vertex a little black pubescence, the margin being fringed with white. Thorax: the pubescence on the prothorax cinereous, the tegulæ and scutellum fringed with black, a tuft of white beneath the wings and another behind their insertion; the scutellum has on each side an obtuse tooth, sometimes nearly obsolete. Abdomen: the basal segment has on each side a tuft of snow-white pubescence, the second, third and fourth segments have on each side an oblong-quadrate snow-white spot; all the tibiæ have a snow-white spot at their base; the wings fusco-hyaline, darkest towards their apical margins. B.M.

Male.—This sex only differs in having a white fringe on the anterior and intermediate femora and the addition of two spots on the fifth abdominal segment. B.M.

The synonymy of the two species of the genus *Melecta* which we find in this country has been greatly confused, and the true *Melecta punctata* has been deemed an unfathomable enigma: it is quite true that the descriptions of the *punctata* of Fabricius would apply equally well to either of the indigenous species; but on referring to his last work, the 'Systema Piezatorum,' we find the genus *Melecta* of Latreille adopted, and the *M. punctata* given as synonymous with the species figured by Panzer, which

is undoubtedly identical with the *A. luctuosa* of Scopoli and Schrank: the description of the latter author is admirable.

This species appears to be by far the most abundant and widely distributed, occurring in Denmark and Sweden; the second species, *M. armata*, not having been observed so far to the north of Europe. In this country, *M. luctuosa* is by far the scarcer of the two, it is extremely local, and is parasitic on *Anthophora retusa*; it appears therefore later in the season than *M. armata*, usually about the beginning of May; it has occurred on Hampstead Heath, Blackheath, near Shirley, at Hawley, Hants, and Coomb Wood, Surrey.

2. Melecta armata.

M. atra, cinereo-villosa; abdominis segmentis utrinque puncto ovato albo ornatis.

Apis punctata, *Kirby, Mon. Ap. Angl.* ii. 219. 35 ♂ ♀.
Don. Brit. Ins. xii. 47. 376.
Andrena armata, *Panz. Faun. Germ.* 70. 22.
Melecta punctata, *Brullé, Expéd. Sc. de Morée*, iii. 342. 717.
Curtis, Brit. Ent. t. 125 ♂.
Smith, Zool. iii. 1148. 1.
Melecta Clotho, *Newm. Ent. Mag.* ii. 513 ♀.
Melecta Alecto, *Newm. Ent. Mag.* ii. 513. 3 ♂.
Var. Melecta Tisiphone et Megæra, *Newm. Ent. Mag.* ii. 513 ♀.

Female. Length 6–7 lines.—Black; the face and vertex clothed with long cinereous pubescence, that on the clypeus brightest, the labrum and cheeks have a black pubescence. Thorax: the disk has the pubescence cinereous, that on the scutellum is black, and on each side is a tuft of white; the wings subhyaline, their margins fuscous; the intermediate and posterior tibiæ have a white patch at their base. Abdomen smooth and shining, a tuft of white pubescence on each side at the base, the second segment has a similar tuft, and sometimes a round spot within, the third and fourth have on each side a minute round spot of white pubescence. B.M.

Var. β. Black; the pubescence black, intermixed on the face, thorax anteriorly, and on the metathorax laterally with cinereous; an obscure cinereous spot at the base of the intermediate and posterior tibiæ; the abdomen obscurely cinereous at the base, the third and fourth segments have on each side a minute white spot. (*Megæra*, Newm.)

Var. γ. The pubescence black, except a few cinereous hairs on

each side of the metathorax and abdomen at its base; a minute cinereous spot sometimes on each side of the third segment. (*Tisiphone*, Newm.)

Male. Length 6–7 lines.—Black; the face has the pubescence cinereous, that on the thorax is of the same colour; the scutellum bidentate and covered with black pubescence, the intermediate tibiæ above and the posterior pair at their base have a short white pubescence. Abdomen: the base thinly clothed with cinereous pubescence, and having on each side a tuft of nearly white pubescence, a similar tuft on the second, and two minute white spots on each of the following segments placed laterally, and sometimes the fifth segment is also spotted. B.M.

The male seldom varies in the markings of the abdomen, and the colouring in other respects is pretty constant; but if the insect is reared from the cells, the entire pubescence will have an ochraceous tint; the same is the case in very recent specimens taken at large: the female varies greatly, from the pretty spotted insect described to one totally black. This species is found in all parts of the United Kingdom; it may be seen in multitudes, frequenting the nests of *Anthophora acervorum*; in these attacks it is frequently accompanied by *Chrysis ignita*.

Subfamily 3. DASYGASTRÆ, *Latr.*

Genus 7. OSMIA.

Apis, pt., *Linn. Syst. Nat.* 953 (1766).
Andrena, pt., *Fabr. Ent. Syst.* ii. 307 (1793).
Anthophora, pt., *Fabr. Syst. Piez.* 372 (1804).
Osmia, *Latr. Encycl. Méth.* viii. 576 (1791).
Amblys, *Klug, Illig. Mag.* vi. (1807).
Hoplitis, *Klug, Illig. Mag.* vi.
Trachusa, pt., *Jurine, Hym.* (1808).
Diphisis, *St. Farg. Hym.* ii. 307 (1841).

The labial palpi four-jointed, the basal joint elongate, the second nearly twice as long, the third and fourth minute, the third inserted at the apex of the second, the fourth at the apex of the third, the two latter clavate, truncate at their apex. The maxillary palpi four-jointed, the basal joint stoutest, broadest at the base, about the same length as the second and third joints, the apical

joint minute. The superior wings with one marginal and two submarginal cells, the second submarginal cell receiving the two recurrent nervures.

In the female the head is usually very large, subquadrate, the ocelli placed forward on the vertex in a slight curve; the abdomen furnished with a dense pollen-brush beneath.

Males usually resembling the females, but more slender, having the antennæ longer, and the apex of their abdomen generally armed with spines or teeth.

If I were asked which genus of bees would afford the most abundant materials for an essay on the diversity of instinct, I should without hesitation point out the genus *Osmia*. I propose to notice in this place all that has occurred to me during an attentive observation of their economy for the last twenty years. Mr. Kirby in the 'Monographia Apum Angliæ,' has quoted the history of Reaumur's Mason-bee, which although not included in the present genus, is still so nearly allied, that its history might be taken as a parallel to that of *Osmia*; but as it is not a British species, I merely allude to it, to call attention to the highly interesting history given by Reaumur of its economy. The most abundant species is *Osmia bicornis*; its economy is varied by circumstances; in hilly country, or at the sea-side, it chooses the sunny side of cliffs or sandy banks, in which to form its burrows; but in cultivated districts, particularly if the soil be clayey, it selects a decaying tree, preferring the stump of an old willow; it lays up a store of pollen and honey for the larvæ, which when full-grown spin a tough dark brown cocoon, in which they remain in the larva state until the autumn, when the majority change to pupæ, and soon arrive at their perfect condition; many however pass the winter in the larva state. In attempting to account for so remarkable a circumstance, all must be conjecture, but it is not of unfrequent occurrence; this species also frequently makes its burrows in the mortar of old walls. *Osmia leucomelana* may be observed availing itself of a most admirable, and almost ready, adaptation for a burrow; it selects the dead branches of the common bramble; with little labour the parent bee removes the pith, usually to the length of from five to six inches; at the end she deposits the requisite quantity of food, which she closes in with a substance resembling masticated leaves,—evidently vegetable matter; she usually forms five or six cells in one bramble-stick. The bee does not extract the whole of the pith, but alternately widens and contracts the diameter of the tube, each contraction marking the end of a cell;

the egg is deposited on the food immediately before closing up the cell; it is white, oblong, and about the size and shape of a caraway-seed: the larva is hatched in about eight days, and feeds about ten or twelve, when it is full-grown; it then spins a thin silken covering, and remains in an inactive state until the following spring, when it undergoes its transformations, and appears usually in the month of June.

Osmia hirta burrows in wood, seldom in any other material; the same habit will be observed in *Osmia ænea*; but I have observed this bee more than once constructing its burrow in the mortar of walls, and sometimes in hard sand-banks. *Osmia aurulenta* and *O. bicolor* are bees which commonly burrow in banks, the latter being very abundant in some situations, forming colonies; but although it appears to be the natural habit of these species to construct tunnels in hard banks, with great labour and untiring perseverance, still we find them at times exhibiting an amount of sagacity, and a degree of knowledge, that at once dispels the idea of their actions being the result of a mere blind instinct, impelling them in one undeviating course. A moment's consideration will suffice to call to mind many tunnels and tubes ready-formed, which would appear to be admirably adapted for the purposes of the bee—for instance, the straws of a thatch, and many reeds; and what could be more admirably adapted to their requirements than the tubes of many shells? So thinks the bee! *O. aurulenta* and *O. bicolor* both select the shells of *Helix hortensis* and *H. nemoralis*: the shells of these snails are of course very abundant, and lie half hidden beneath grass, mosses, and plants; the bees finding them in such situations, dispense with their accustomed labour and take possession of the deserted shells. The number of cells varies according to the length of the whorl of the shell selected, the usual number being four, but in some instances they construct five or six, commencing at the end of the whorl; a suitable supply of pollen and honey is collected, an egg deposited, and a partition formed of abraded vegetable matter; the process is repeated until the requisite number is formed, when the whole is most carefully protected by closing up the entrance with small pellets of clay, sticks and pebbles; these are firmly cemented together with some glutinous matter, and the bee has finished her task.

We will now observe the intelligence of the bee under different circumstances: she has selected the adult shell of *Helix aspersa*; the whorl of this species is much larger in diameter than that of *H. nemoralis* or *H. hortensis*—too wide, in fact, for a single cell; our little architect, never at a loss, readily adapts it to her purpose by forming two cells side by side, and as she ad-

vances towards the entrance of the whorl, it becomes too wide even for this contrivance; here let us admire the ingenuity of the little creature; she constructs a couple of cells transversely! And this is the little animal which has been so blindly slandered as being a mere machine!

I will take this opportunity of correcting a very widely diffused error, which appears to have originated with Reaumur; or, if his account of the development of *Xylocopa* be correct, it differs from that of every wood-boring bee which inhabits this country: he says, "When the larva assumes the pupa, it is placed in its cell with its head downwards; a very wise precaution, for thus it is prevented, when it has attained to its perfect state and is eager to emerge into day, from making its way out upwards, and disturbing the tenants of the superincumbent cells, who being of later date, each than its neighbour below-stairs, are not yet quite ready to go into public." Mr. Kirby also quotes from a letter by the Rev. George Ashby, who, after describing the nest of *Megachile centuncularis*, says, "The lowest and first born passes out through the bottom of its own (lowest) cell; and so escapes without disturbing the rest, who are not yet ready to emigrate." All such conclusions originate in conjecture. In the case of *Osmia aurulenta* constructing her cells in the spiral tube of a snail's cell, where is the possibility of escape? when burrowing in a sand-bank, the same difficulty presents itself; when *Chelostoma florisomnis* avails itself of the tube of a straw or reed, how is the insect to pass the first knot which opposes its escape? Such are the results of theoretical conclusions: let us seek for knowledge in the careful investigation of the operations of nature.

A bee is observed to alight on an upright post, or other wood suitable for its purposes; she commences the formation of her tunnel, not by excavating downwards, as she would be incommoded with the dust and rubbish which she removes; no, she works upwards, and so avoids such an inconvenience. When she has proceeded to the length required, she proceeds in a horizontal direction to the outside of the post, and now her operations are continued downwards; she constructs a cell near the bottom of the tube, a second and a third, and so on to the required number; the larvæ when full-fed have their heads turned upwards; the bees which arrive at their perfect condition, or rather those which are first anxious to escape into day, are two or three in the upper cells, these are males; the females are usually ten or twelve days later. This is the history of every wood-boring bee which I have bred, and I have reared broods of nearly every species indigenous to the country. I have observed in the instance of *Chelostoma florisomnis*, that whilst one bee was carry-

ing on her operations as detailed above, another was tunneling in a horizontal rail: here no lower opening was required, the bee pushed the chips out at the entrance, and as no outlet was necessary at the end of the tunnel, the bee in this case made none.

There is still another species of this genus whose habits are so different to the rest, that our admiration of the ingenuity of these bees is greatly increased when we consider its curious details, and reflect upon the degree of care and foresight exhibited by the provident parent,—this is the *Osmia parietina*, a bee only found in the northern parts of this country. This species selects the underside of a slate or stone lying on the ground, and having a hollow space beneath; to the stone the bee attaches the little balls of pollen. A stone of this kind was found at Glen Almond, Perthshire, on the Grampians, 800 feet above the level of the sea, by Mr. J. Robertson, who, on turning it up, observed a mass of cocoons; although he was not much acquainted with entomology, still he knew them to be the production of some insect; he presented the stone to the British Museum, and it was placed in my hands for observation. The size of the stone was 10 inches by 6; the number of cocoons attached to it two hundred and thirty: when first discovered, about one-third of them were empty; this was in the month of November. In the beginning of the following March, a few males made their appearance, and shortly afterwards some females; they continued to come forth occasionally until the end of June; at this time there remained thirty-five undeveloped cocoons; on opening one or two of them, they proved to contain active larvæ; these I carefully closed, and left the whole undisturbed until the following April, at which time, on examination, they proved to be still in the larva state; but at the end of May they changed to pupæ, and about the end of June began to come forth perfect insects. This, then, was the result—a portion of a deposit of eggs made in 1849 had been three years in arriving at maturity: when found, one-third were developed; the following year a second brood came forth, and whilst in my possession a third. In the first instance, the whole deposit was subject to the same influences, and had produced larvæ; what was the cause of the retarded development of the rest, it were vain to attempt to determine.

The *Osmia parietina* is subject to the parasitical attacks of a species of *Chrysis*, which destroys them in the larva state. The *Chrysis* obtained from the cocoons of this bee is a new species, closely allied to the *C. Austriaca*. A chalcididous insect, *Monodontomerus dentipes*, is parasitic on the larva of *O. bi-*

cornis: large numbers of them have been obtained from the cocoons of that bee.

I have observed *Stelis phæoptera* entering the burrows of *O. hirta* and *O. cærulescens*; it is parasitic upon these species.

Stelis octomaculata is parasitic on *O. leucomelana*, and *Stelis minuta* is parasitic on the same species.

I trust it will not be considered that I have enlarged more than is desirable upon the economy of these interesting insects; but who can reflect upon the variety of situations in which they form their cells, the expedients to which they resort, and not admire the patience, the skill, and the admirable ingenuity by which these bees accomplish their purpose?

1. Osmia rufa.

O. atra, hirsuta; abdomine æneo, hirsutie rufa tecto; fronte, in *fœmina*, bicorni, atra; fronte in *mare* simplici, albida; ano integro.

Apis rufa, *Linn. Faun. Suec.* p. 420. 1690; *Syst. Nat.* i. 954. 9 ♂, & *Cab. Mus. Linn. Soc.*
Fabr. Syst. Ent. p. 385. 39; *Ent. Syst.* ii. 334. 88.
Rossi, Faun. Etrusc. ii. 103. 913.
Panz. Faun. Germ. 56. 10.
Apis bicornis, *Linn. Faun. Suec.* p. 420. 1691; *Syst. Nat.* i. 954. 10 ♀, & *Cab. Mus. Linn. Soc.*
Fabr. Syst. Ent. p. 384. 38.
Christ. Hym. p. 159. t. 12. f. 9.
Rossi, Mant. p. 310.
Kirby, Mon. Ap. Angl. ii. 271. 57.
Apicis bicornis, *Harris, Expos.* p. 162. t. 49. f. 4 ♀.
Apicis agino, *Harris, Expos.* p. 162. t. 49. f. 7 ♂.
Apis cornigera, *Rossi, Faun. Etrusc.* ii. 108. 925 ♀.
Panz. Faun. Germ. 55. 15.
Megachile cornigera, *Spin. Ins. Lig.* fasc. i. 147. 15 ♀.
Anthophora bicornis, *Fabr. Syst. Piez.* p. 375. 16 ♂ ♀.
Zett. Ins. Lapp. p. 466. 5.
Megachile bicornis, *Latr. Hist. Ins.* xiv. p. 50.
Spin. Ins. Lig. fasc. i. 147. 15.
Osmia bicornis, *Latr. Encycl. Méth.* viii. 576. 3.
St. Farg. Hym. ii. 314. 2.
Smith, Zool. ii. 745. 8.
Nyland. Ap. Boreal. p. 259. 1.
Amblys rufa, *Klug, Illig. Mag.* vi. 198. 220.
Osmia rufa, *Smith, Cat. Brit. Hym.* p. 78. 1.
Nyland. Revis. Ap. Boreal. p. 269. 1.

Female. Length 4–6 lines.—Head and thorax nigro-æneous; the face clothed with black pubescence, and armed on each side of the clypeus with a stout horn, which is oblique, or sometimes notched at the apex, the horns bent inwards. Thorax: the disk clothed with black pubescence, intermixed with fulvous posteriorly; that on the sides beneath, on the metathorax and femora, of a yellowish-white; the pubescence on the tibiæ and tarsi fulvous, that on the tarsi beneath rufo-fulvous; the calcaria and claws rufo-testaceous; wings subhyaline, clouded towards their apex, the marginal cell having a fuscous stripe along its anterior margin; the nervures fusco-ferruginous. B.M.

Var. β. Length 4 lines.—The horns on the face angular.

Male. Length 3½–5 lines.—Strongly resembling the female, the face unarmed, clothed with long white hair; the antennæ slender and filiform, nearly as long as the thorax; the head and thorax are of a blue-green, the wings as in the female; the pubescence on the disk of the thorax long and of an ochraceous tint, the legs clothed as in the other sex. Abdomen densely clothed with long fulvous pubescence, suberect, and arranged in fasciæ; the margin of the apical segment entire. B.M.

This is by far the most abundant species of the genus, and is distributed over the country; it is met with in all parts of the continent, from the south of Italy to the north of Lapland. The beautiful bright colouring of the insect soon fades from age, and is met with of all shades between that of the description and an entirely hoary pubescence.

Osmia cornuta has been recorded as being found in this country, but there is no satisfactory evidence of the fact; it is therefore omitted.

2. Osmia aurulenta.

O. nigra, ferrugineo-rufo-villosa; abdominis segmentis marginibus fulvis, ano in *mare* bidentato.

Apis aurulenta, *Panz. Faun. Germ.* 63. 22 ♀.
Apis hæmatoda, *Panz. Faun. Germ.* 81. 20 ♂.
Apis tunensis, *Kirby, Mon. Ap. Angl.* ii. 269. 56.
Megachile tunensis, *Latr. Hist. Nat.* xiv. 58. 13 ♀.
Spin. Ins. Lig. fasc. i. p. 144. 11.
Osmia aurulenta, *Latr. Encycl. Méth.* viii. 584. 19.
St. Farg. Hym. ii. 323. t. 20. f. 4 ♀.
Nyland. Ap. Boreal. Supp. p. 103.

Osmia tunensis, *Brullé, Expéd. Sc. de Morée*, iii. 388. 751.
Smith, Zool. ii. 744. 6.
Lucas, Explor. Sc. Algér. iii. 189. 106. t. 7. f. 6.

Female. Length 4–4¾ lines.—Black, closely punctured; the head large, subquadrate, nearly as wide as the thorax; mandibles stout, tridentate, the apical tooth acute; the face clothed with a short fulvous pubescence; the antennæ not longer than the head, subfiliform and slender. Thorax clothed with a rufo-fulvous pubescence, paler beneath; the wings fusco-hyaline, the nervures and tegulæ ferruginous; the legs have a rufo-fulvous pubescence, that on the tarsi beneath bright ferruginous; the calcaria rufo-testaceous, the claws ferruginous. Abdomen subglobose, at the base and on the sides a rufo-fulvous pubescence; the margins of the segments have a short fringe of the same colour; beneath densely clothed with bright ferruginous pubescence. B.M.

Male. Length 4–5½ lines.—The face densely clothed with long pale pubescence, that on the vertex and disk of the thorax ochraceous; both the latter have an æneous tinge; the pubescence on the sides of the thorax and beneath, hoary; the legs have a similar pubescence; the wings as in the female. Abdomen narrowest at its base, obscurely æneous, the base has a little pale pubescence, the margins of the three apical segments have a fringe of bright fulvo-ferruginous pubescence; the margin of the sixth segment slightly notched in the middle and deeply emarginate laterally, forming a stout incurved tooth; the apical segment concealed, bidentate. B.M.

This species is very abundant in many localities in the western and south-western counties, but no examples have been received from the north. I have a series of specimens from Wales even richer in colour than my own bred specimens. The male described by Mr. Kirby as belonging to this species is that of *O. xanthomelana*, as may be seen by an examination of the typical specimen in the Kirbian collection. The usual time for this insect to appear is the end of March, but it is found most numerously in April and May.

3. Osmia bicolor.

O. hirsuta aterrima; abdomine tarsisque quatuor posticis hirsuto-ferrugineis. Corpore in *mare* fusco-æneo, hirsutie pallida, ano emarginato.

Apis bicolor, *Schrank, Ins. Aust.* p. 806 ♀.
Kirby, Mon. Ap. Angl. ii. 277. 58.

Apis fusca, *Christ. Hym.* p. 182. t. 14. f. 10 ♀.
Panz. Faun. Germ. 56. 11.
Anthophora fusca, *Fabr. Syst. Piez.* p. 377. 20.
Osmia bicolor, *Latr. Encycl. Méth.* viii. 580. 10 ♀.
St. Farg. Hym. ii. 318. 7.
Smith, Zool. 746. 9 ♂ ♀.
Nyland. Ap. Boreal. Supp. p. 103.

Female. Length 4½–5 lines.—Black; the head not so wide as the thorax, both clothed with deep black pubescence; wings subhyaline, their apical margins having a fuscous cloud, the nervures and tegulæ black; the intermediate and posterior tibiæ and all the tarsi have a short ferruginous pubescence; the tarsi obscure ferruginous. Abdomen subglobose, clothed with bright ferruginous pubescence above and beneath; the base above has a little black pubescence. B.M.

Male. Length 4½ lines.—Fusco-æneous, head and thorax very closely punctured; the face clothed with pale yellow pubescence, that on the clypeus very dense, and nearly white. Thorax: the disk thinly clothed with pale yellow pubescence, much paler on the sides, hoary beneath; the legs have a pale pubescence, the apical joints of the tarsi ferruginous. Abdomen oblong-ovate, shining, and thinly covered with long pale pubescence; two or three of the apical segments have a fringe of pale fulvous pubescence, as well as the extreme lateral margins of the abdomen; the margin of the sixth segment entire, the seventh bidentate, or rather deeply notched. B.M.

No examples of this insect have been found in the north of England, nor is it frequently met with in the vicinity of London; it was taken twice or thrice, some years ago, at Old Brompton. It occurs in profusion at Purfleet, and in several places in Kent, and abounds in the vicinity of Bristol. Mr. Walcott has captured several gigantic examples of the male, some of which are eight lines in length. The males are frequently entirely hoary.

4. Osmia xanthomelana.

O. aterrima, villosa; thorace abdominisque basi lanuginoso-fulvescentibus; corpore in *mare* fulvescenti hirsuto; fronte albida; abdomine nigro-æneo, ano bidentato.

Apis xanthomelana, *Kirby, Mon. Ap. Angl.* ii. 246. 46 ♀.
Osmia atricapilla, *Curtis, Brit. Ent.* v. t. 222 ♀.
Waterh. Zool. ii. 403 ♂ ♀.

Osmia nigriventris, *Zett. Ins. Lapp.* p. 465. 4 ♀.
Osmia xanthomelana, *Smith, Zool.* ii. 745. 7.
Steph. Ill. Brit. Ent. Mand. vii. *Supp.* 16. 2. t. 43. f. 2.
Nyland. Ap. Boreal. Supp. p. 270. 5.

Female. Length 4½–6¾ lines.—Black; head as wide as the thorax, the face clothed with black pubescence, intermixed with brown on the margin of the vertex. Thorax clothed above with reddish-brown pubescence; that on the sides beneath, and also that on the legs, black; the wings fusco-hyaline, a dark cloud occupying the upper portion of the marginal cell, the nervures fusco-ferruginous. Abdomen shining, subglobose; the first, and the basal margin of the second segment, with reddish-brown pubescence, on the following segments it is black; beneath, densely clothed with black pubescence. B.M.

Male. Length 4–4¾ lines.—The head as wide as the thorax, the face clothed with white pubescence, intermixed with ochraceous at the insertion of the antennæ, which are shorter than the thorax; the thorax has a fulvous pubescence above, beneath it is griseous; the wings rather clearer than in the other sex. Abdomen shining, its pubescence fulvous; the sixth segment slightly notched in the middle, the seventh bidentate; beneath, the second ventral plate is pointed in the middle, and the third deeply notched, the notch ciliated with bright yellow hairs.

I once met with this very local species in Sandown Bay, Isle of Wight, in the beginning of July, when I captured two specimens of the female; they were in a faded condition, the time for the appearance of the insect being April. Mr. Waterhouse has given an excellent account of the habits of this insect in the 'Zoologist.' In my collection are two small examples of this species, which Dr. Nylander separated from *O. xanthomelana*, and assured me that they were the *O. fuciformis* of Latreille. Such may be the case, but if so, I can only regard that species as synonymous with the present: indeed the description in the 'Encyclopédie Méthodique' points out no distinct differences. The colour of the thorax changes from deep fulvous to ochraceous from age and exposure; the abdomen, when denuded of pubescence, shows the base to be rather narrower than towards the apex.

5. Osmia parietina.

O. aterrima, villosa; capite, thorace, abdominisque segmento

primo, in *mare* et *fœmina* fulvo-villosis; ano in *mare* integro; facie subcinerea.

Osmia parietina, *Curtis, Brit. Ent.* v. t. 222 ♀.
Smith, Zool. ii. 743. 4 ♀; *Cat. Hym. Acul. Append.* p. 123 ♂.

Female. Length 4 lines.—Black: the face clothed with long pale fulvous pubescence, at the insertion of the antennæ it is brighter, as well as that on the margin of the vertex; the clypeus produced and truncate anteriorly. Thorax densely clothed with rather long rich rufo-fulvous pubescence; wings subhyaline, and having a fuscous cloud at their apical margins, and a dark fuscous stain on the exterior margin of the marginal cell; the nervures fusco-ferruginous; the pubescence on the legs above black, intermixed with pale fulvous on the tarsi, which are of a reddish-brown beneath; the claws ferruginous. Abdomen shining and very delicately punctured, the basal segment thinly clothed with fulvous pubescence; beneath densely clothed with black pubescence. B.M.

Male. Length 3–3½ lines.—Head and thorax brassy-black, the face below the antennæ, and the cheeks, covered with long white pubescence, that on the vertex is thin and ferruginous; the thorax clothed above with rufo-fulvous pubescence; beneath, as well as on the legs, it is hoary; wings as in the other sex. Abdomen subglobose, shining and delicately punctured, the basal segment clothed with long, erect, pale pubescence, on the following segments it is shorter and black; the sixth segment entire, the seventh concealed, notched in the middle. B.M.

This little bee was first taken by Mr. Curtis, some years ago, at Ambleside, on the banks of Windermere, in Westmoreland; for twenty years subsequently no person met with it, until it was rediscovered in 1850 on the Grampians, in Perthshire; it is a beautiful species, and doubtless extremely local; it has also been captured at Loch Rannoch.

6. Osmia pilicornis.

O. aterrima, villosa; capite, thorace abdominisque segmentis duobus basalibus in *fœmina* fulvo-villosis; antennis in *mare* subtus ciliatis; capite, thorace abdomineque cinereo-hirsutis; ano emarginato.

Osmia pilicornis, *Smith, Zool.* iv. 1567 ♂ ♀.

Female. Length 4–4½ lines. — Black; the face has a thinly scattered black pubescence, the head is closely punctured, the clypeus coarsely so, slightly produced, its anterior margin trun-

cate; the antennæ slightly piceous beneath. Thorax clothed above with rufo-fulvous pubescence; the wings fusco-hyaline, their apical margins having a darker cloud; the marginal cell has a fuscous stripe above; the tegulæ and nervures rufo-piceous. Abdomen subglobose, shining and faintly punctured, the two basal segments thinly clothed with pale fulvous pubescence; beneath the pubescence is dense and black. B.M.

Male. Length 4–4¼ lines.—Nigro-æneous; the face densely clothed with long white pubescence, at the insertion of the antennæ it is pale ochraceous; the antennæ nearly as long as the head and thorax, the flagellum pilose beneath. Thorax thinly clothed on the disk with long pale ochraceous pubescence, at the sides and beneath it is white, the anterior femora densely fringed with white pubescence, on the rest of the femora, tibiæ, and tarsi it is of the same colour, but thinly scattered; the posterior femora and tibiæ subincrassate; the wings subhyaline and iridescent. Abdomen ovate, shining and closely punctured, the apical margins of the segments impunctate and very glossy, at the base, sides, and apex, a long griseous pubescence; on the third and fourth segments it is slightly ochraceous; the sixth and seventh segments are both deeply emarginate in the middle. B.M.

The female of this species very closely resembles that of *O. parietina*, from which it may at once be distinguished by having black pubescence on the face and fulvous pubescence on the two basal segments; *O. parietina* also agrees with *O. xanthomelana* in the colour of its pubescence, but the latter has the face densely covered with black pubescence, whilst in *O. parietina* it is very pale. This is a very local species, and was once captured in the month of April, at Birch Wood, Kent. Mr. Walcott finds both sexes near Bristol in considerable abundance; he observes that it appears to confine its visits to the flowers of the Common Bugle.

7. Osmia fulviventris.

O. atra, pallido-villosa; abdomine nitido, atro-cærulescenti, ventre lana ferruginea tecto; ano in *mare* subemarginato.

Apis fulviventris, *Panz. Faun. Germ.* 56. 18.
Apis Leaiana, *Kirby, Mon. Ap. Angl.* ii. 263. 54 ♀.
Osmia Leaiana, *Spin. Ins. Lig.* fasc. 3. p. 200. 1 ♀.
Nyland. Ap. Boreal. p. 262. 3 ♀.
Osmia fulviventris, *Latr. Encycl. Méth.* viii. 578. 7.
St. Farg. Hym. ii. 319. 9.

Osmia fulviventris, *Brullé, Hist. Nat. Canar.* ii. pt. 2. *Entom.* p. 85. 18.
Lucas, Explor. Sc. Algér. iii. 192. 115.
Nyland. Ap. Boreal. Revis. p. 272. 10.
Osmia hirta, *Smith, Zool.* ii. 742. 3.

Female. Length 4–5 lines.—Black: head as wide as the thorax, subquadrate; the head and thorax very closely punctured; the face thinly clothed with pale fulvous pubescence; the anterior margin of the clypeus bidentate; the mandibles very stout, pubescent at the sides; the antennæ not longer than the head. Thorax thinly clothed with pale fulvous pubescence, that on the legs is of the same colour; wings fusco-hyaline, their margins having a dark fuscous cloud. Abdomen oblong, atro-cæruleous, a little narrowed towards the base, very glossy, strongly and regularly punctured; beneath densely clothed with bright ferruginous pubescence. B.M.

Male. Length 4–5 lines.—Nigro-æneous, similarly punctured to the female; the face clothed with fulvous pubescence, that on the clypeus of a paler and brighter colour; the antennæ a little longer than the head; the disk of the thorax clothed with long fulvous pubescence, palest at the sides and beneath. Abdomen oblong-ovate, thinly covered with pale fulvous pubescence, the margins of the segments slightly depressed; the sixth segment has its margin notched in the middle, and has a slight central depression; the seventh segment is bidentate. B.M.

This species appears to be widely dispersed, but it is still a local insect; it is not uncommon about Battersea and Hammersmith during June and July. Mr. Wollaston brought examples from Cornwall. It makes its burrows in decaying wood. *Stelis phæoptera* has been observed entering its nests.

As there is a doubt whether Fourcroy's *Apis hirta* is really synonymous, Latreille's name has been adopted for the species.

8. Osmia spinulosa.

O. atra cinereo-subvillosa; scutello bidentato; ano *maris* inflexo, spinuloso, ventre basi cornuto.

Apis spinulosa, *Kirby, Mon. Ap. Angl.* ii. 261. 53.
Osmia spinulosa, *Smith, Zool.* ii. 741. 2.

Female. Length 3–3¾ lines.—Black, shining, and strongly punctured; the face has a little cinereous pubescence at the sides of the clypeus, and a little pale ochraceous pubescece at the in-

sertion of the antennæ. Thorax: the disk thinly covered with pale ochraceous pubescence, at the sides and beneath it is hoary; the scutellum rounded behind, and armed on each side with a small acute tooth; the wings fusco-hyaline, palest towards their base, the nervures fuscous; the legs have a short griseous pubescence, the calcaria pale testaceous, the claws ferruginous. Abdomen subglobose, shining, and strongly punctured, the margins of the segments slightly depressed; beneath densely clothed with fulvous pubescence. B.M.

Male. Length 3 lines.—Black, very closely punctured; the face densely clothed with pale yellow pubescence; the antennæ filiform, a little longer than the head. Thorax having a sparing pale ochraceous pubescence; wings as in the female; the apical joints of the tarsi ferruginous. Abdomen incurved, the sixth segment having a series of minute spines on its apical margin; the seventh segment armed with a short tooth in the centre of its apical margin; beneath, and the basal segment, armed with a stout acute spine. B.M.

This little bee is not uncommon during July and August in some localities; Mr. S. Stevens has taken it in Sussex, and it has frequently occurred in various parts of Kent and Hampshire; it is plentiful at the landslip, Luccomb Chine, Isle of Wight, in July, and may be found reposing in a species of *Hieracium* in company with *Panurgus calcaratus*. It does not occur in the London district. It is easily distinguished from all the other species.

9. Osmia ænea.

O. corpore *fœminæ* cærulescenti, albido-subpubescenti; ventre lana atra dense vestito: corpore *maris* æneo, fulvo-pubescenti, ano bidentato.

Apis ænea, *Linn. Faun. Suec.* p. 421. 1695; *Syst. Nat.* i. 995. 20 ♂.
Scop. Ent. Carn. p. 303. 809.
Apis cærulescens, *Linn. Faun. Suec.* p. 421. 1696 ♀; *Syst. Nat.* i. 995. 21 ♀.
Kirby, Mon. Ap. Angl. ii. 264. 55 ♂ ♀.
Andrena cærulescens, *Fabr. Syst. Ent.* p. 376. 2 ♀.
Rossi, Faun. Etrusc. ii. 86. 893.
Panz. Faun. Germ. 65. 18.
Andrena ænea, *Rossi, Faun. Etrusc.* ii. 96. 894 ♂.
Panz. Faun. Germ. 56. 3.
Anthophora ænea, *Fabr. Syst. Piez.* p. 381. 40.

Megachile cærulescens, *Spin. Ins. Lig.* fasc. 1. 145. 12.
Osmia cærulescens, *Latr. Encycl. Méth.* viii. 581. 12 ♂ ♀.
St. Farg. Hym. ii. 325. 16.
Brullé, Hist. Nat. Canar. iii. 85. 10.
Smith, Zool. ii. 743. 5.
Lucas, Explor. Sc. Algér. iii. 190.
Nyland. Ap. Boreal. p. 262. 4; *Revis. Ap. Boreal.* p. 271. 8.
Abeille maçonne, etc., *De Geer, Ins.* ii. 751. t. 30. f. 23 ♀ & t. 32. f. 1 ♂.

Female. Length 3½–4⅓ lines.—Deep blue; head as wide as the thorax, subquadrate, closely punctured, the antennæ not longer than the head; mandibles very stout, longitudinally grooved, pubescent; a little white pubescence on each side of the face below the insertion of the antennæ, the cheeks have also a white pubescence. Thorax very closely punctured, and having a little white pubescence at the sides of the metathorax; the wings subhyaline, the margins having a fuscous cloud; the legs have a glittering hoary pubescence. Abdomen subglobose, shining, finely and closely punctured, at the base there is a little thin hoary pubescence, the apical margins of the segments have a narrow white fringe, broadly interrupted on the three basal ones, usually obliterated on the first; beneath densely clothed with black pubescence. B.M.

Male. Length 3¼–4¼ lines.—Brassy-green; the head and thorax very closely punctured, the head subquadrate, as wide as the thorax; the face clothed with long fulvous pubescence, palest on the clypeus. Thorax: the disk thinly covered with pale fulvous pubescence; beneath more or less hoary; the wings as in the other sex. Abdomen narrowed at the base, shining, finely and closely punctured, the margins of the two basal segments depressed; two or three of the apical segments have a narrow pale fringe; the sixth segment has its margin slightly notched in the middle, the seventh is incurved, bidentate. B.M.

This species is found in all parts of the kingdom. The colour of the female varies, being sometimes deep blue, at other times nearly black; it also varies a good deal in size. The *O. purpurascens* of Smith's Catalogue has been discovered to be a North American insect.

10. Osmia leucomelana.

O. aterrima, albido-subvillosa; abdominis segmentis marginibus

utrinque albis, ventre lana cinerascenti tecto. Corpore *mari* fusco, ano in medio fovea impresso.

Apis leucomelana, *Kirby*, *Mon. Ap. Angl.* ii. 260. 52 ♀.
Osmia leucomelana, *Smith*, *Zool.* ii. 741. 1 ♂ ♀.
Nyland. Ap. Boreal. p. 243. 5 ♀; *Supp. Ap. Boreal.* p. 105 ♂.

Female. Length 3⅔–4⅓ lines.—Black; the head as wide as the thorax, both very closely punctured; the flagellum rufo-piceous beneath; the margin of the clypeus subemarginate. Thorax: the disk shining, a little cinereous pubescence at the sides; the wings fusco-hyaline, their apical margins having a fuscous cloud; the legs have a glittering white pubescence, that on the tarsi beneath fulvous, the calcaria and apical joints of the tarsi pale ferruginous. Abdomen very glossy, oblong-ovate, the two basal segments have their margins a little depressed; the margins of the three basal segments have on each side a narrow fringe of white pubescence, the fourth a continuous fringe; beneath clothed with cinereous pubescence. B.M.

Male. Length 3–4 lines.—Brownish-black, strongly punctured; the face clothed with pale fulvous pubescence, the flagellum fulvo-piceous beneath. Thorax thinly clothed with pale fulvous pubescence, the wings subhyaline; the calcaria and apical joint of the tarsi pale ferruginous. Abdomen ovate, incurved, shining and closely punctured, the margins of the segments narrowly fringed with pale pubescence, frequently obliterated on the two first and interrupted on the third; the sixth segment, on each side, has its extreme lateral margin produced into an angular tooth; the seventh segment is acute at the apex, and has a large deep triangular fossulet in the middle; the margin of the second segment beneath is produced into a large projecting half-circular flattened plate, and the following segments are ciliated with bright fulvous hairs. B.M.

This little bee was one of great rarity in collections some years ago, when a locality was discovered for it at Hawley in Hampshire. I observed it entering the dead branches of the bramble, in the month of June; in the autumn I procured some of the sticks, and bred numbers of both sexes; subsequently it has been found in plenty near Bristol. Three or four specimens have been taken at Charlton in Kent, but it is very local.

Genus 8. MEGACHILE.

Apis, pt., *Linn. Faun. Suec.* p. 419 (1687).
Centris, pt., *Fabr. Syst. Piez.* p. 354 (1804).
Anthidium, pt., *Fabr. Syst. Piez.* p. 364.
Anthophora, pt., *Fabr. Syst. Piez.* p. 372.
Megachile, pt., *Latr. Hist. Nat.* xiv. 51 (1805).
Trachusa, pt., *Jurine, Hym.* (1808).

Labial palpi four-jointed, the two basal joints elongate, of about equal length, attenuated, the second joint having the apex acute; the third and fourth joints minute, clavate, placed at the side and near the apex of the second joint; the palpi about the same length as the labium, which is cylindric and longitudinally channeled and pubescent. The maxillary palpi two-jointed, the basal joint very short, stout and subglobose, the second joint slender and cylindric; the apical lobe of the maxillæ elongate, lanceolate and curved. The superior wings have one marginal and two submarginal cells, the second submarginal receiving the two recurrent nervures. The head is usually as wide as the thorax; the mandibles are very stout; the ocelli are placed in a triangle on the vertex; the females have a dense pollen-brush on the under side of the abdomen. In some species the males have the apical joint of the antennæ compressed and dilated, and some have dilated anterior tarsi.

The bees included in the genus *Megachile* are popularly called Leaf-cutters, from the circumstance of their cutting off pieces of the leaves of various trees, for the purpose of forming the cells in which they store up the food for their larvæ; they appear to prefer the Rose and Laburnum. Many very interesting accounts of their habits have been written; some of the species select decaying trees, posts and rails, in which to form their tunnels; this habit I have observed in *M. Willughbiella* and *ligniseca*, which never appear to choose any other material: I have seen *M. maritima* burrowing in decaying wood, but in Sandown Bay, Isle of Wight, where the species is abundant, it burrows in the cliffs: *M. centuncularis* at one time chooses an old post or decaying tree, at another the soft mortar of an old wall, and sometimes burrows in the ground; I have bred this insect from cells obtained from each of the above

situations. *M. circumcincta* sometimes forms large colonies, and, as far as I have observed, always burrows in banks. I found the rare species, *M. argentata*, constructing its nests in sandy banks on the coast below Southend. The Poppy Bee, *Anthocopa papaveris*, is closely allied to this genus, and may indeed be placed before it, as a connecting link with the *Osmiæ*. This interesting insect, *l'Abeille Tapissière* of Reaumur, has been supposed to inhabit this country, specimens having been placed in the Collection at the British Museum; but it was with much regret that I discovered, when engaged upon the Catalogue of British Bees for the Museum, and had occasion to examine each individual specimen with care, in the first place that there was no satisfactory evidence of their locality; and in the next, that the males associated with the series were those of *Osmia adunca* of Panzer; for these reasons the genus is omitted in this work.

This is probably the most universally distributed genus of bees; it is found in all parts of the world, and, like all the industrial sections, has its parasites; these are the various species of *Cœlioxys*. Mr. Waterhouse bred *C. 4-dentata* from the cells of *M. circumcincta*. I have reared *C. rufescens* from the cells of *Saropoda bimaculata*, and have also obtained *C. conica* from the nest of *M. Willughbiella*; *C. Vectis* is parasitic on *M. maritima*: both the latter species abound in Sandown Bay during the months of July and August.

The males of this genus present broad distinctive specific differences, whilst those of the females are difficult to detect; and it will be necessary to bear in mind that the descriptions are from specimens in the finest condition, the colour of the pubescence soon fading from exposure.

Div. I.—*Anterior tarsi of the males not dilated.*

1. Megachile centuncularis.

M. cinerascenti-pubescens; abdomine *fœminæ* subcordato, segmentorum marginibus albidis; abdomine *maris* subgloboso; coxis anterioribus inermibus.

Apis centuncularis, *Linn. Faun. Suec.* p. 420. 1687; *Syst. Nat.* i. 953. 4 ♀.
Scop. Ent. Carn. p. 300. 799.
Fabr. Syst. Ent. p. 385. 42; *Ent. Syst.* ii. 337. 98.

Apis centuncularis, *Schrank, Ins. Aust.* p. 404. 815.
Schäff. Icon. t. 262. f. 6, 7.
Rossi, Faun. Etrusc. no. 927.
Kirby, Mon. Ap. Angl. ii. 237. 42.
Megachile centuncularis, *Latr. Hist. Nat. Crust. et Ins.* iii. 383; *Hist. Nat.* xiv. 56. 10.
Spin. Ins. Lig. fasc. i. 142. 10.
St. Farg. Hym. ii. 337. 12. t. 21. f. 3 ♀.
Guérin, Icon. Règ. Anim. 449. t. 73. f. 7.
Smith, Zool. ii. 695. 7.
Nyland. Ap. Boreal. p. 258. 4.
Anthophora centuncularis, *Fabr. Syst. Piez.* p. 378. 25 ♀, nec ♂.
Zett. Ins. Lapp. p. 465. 3.
Reaum. Ins. vi. *Mém.* iv. t. 10. f. 2, 3, 4.
Frisch. Ins. pt. xi. t. 2. f. 1–4.
Geoff. Ins. Par. ii. 410. 5.

Female. Length 3½–6 lines.—Black; the face has a pale fulvous pubescence, that on the vertex fuscous and sparing; the mandibles quadridentate, the two apical ones acute; the head and thorax closely and strongly punctured. Thorax: the disk nearly naked, having a few scattered fuscous hairs, on the sides and metathorax it is more dense and pale fulvous; the legs have a thin short cinereous pubescence, the tarsi fulvous beneath; the calcaria and claws rufo-testaceous; the wings subhyaline, faintly clouded towards their apical margins. Abdomen cordate, having a scattered pale pubescence at the base, the margins of the segments depressed; the segments have a narrow fringe of pale pubescence on their apical margins, that on the fifth entire; beneath densely covered with bright golden-fulvous pubescence. B.M.

Male. Length 3½–4⅓ lines.—The head a little wider than the thorax, the face clothed with bright pale fulvous pubescence, nearly white on the clypeus; antennæ filiform; mandibles bidentate, the apical tooth acute; the thorax above and the wings as in the other sex, the anterior coxæ not toothed; the claws ferruginous, their tips fuscous. Abdomen subelongate, the apex obtuse; the margin of the apical segment entire, obsoletely subserrate; the seventh segment concealed. B.M.

This is perhaps the most widely distributed bee in the whole family of *Apidæ*; it is not only found in all parts of the United Kingdom, but is spread all over the continent of Europe, even to the north of Lapland; it is also found in Canada and at Hudson's Bay. The only British species which has similar clothing in the female is *M. maritima*, but if the colour of the pollen-brush be examined, they cannot easily be confounded; *M. centuncu-*

laris has no mixture of black hairs at the apex. The size of the male will separate it from its nearest ally, *M. ligniseca*, independent of other differences.

2. Megachile ligniseca.

M. pallide pubescens; abdomine *fœminæ marisque* oblongo; coxis anterioribus inermibus.

Apis centuncularis, *Panz. Faun. Germ.* 55. 12.
Don. Brit. Ins. iv. t. 120.
Apis ligniseca, *Kirby, Mon. Ap. Angl.* ii. 243. 44. t. 16. f. 11 ♂.
Megachile ligniseca, *Smith, Zool.* ii. 694. 4.
Nyland. Ap. Boreal. Supp. p. 102 ♀.

Female. Length 6–7 lines.—Black: the face has a little pale pubescence on each side of the clypeus, and fulvous at the insertion of the antennæ, on the vertex it is fuscous; on the cheeks, legs, thorax beneath, on the two basal segments of the abdomen, and on the metathorax it is cinereous; on the disk of the thorax it is pale fulvous; the mandibles quadridentate, the two apical teeth subacute, the inner one obtuse; the wings subhyaline, faintly clouded at their apical margins; the tarsi fulvous beneath, the claws ferruginous. Abdomen oblong-ovate, the margins of the segments deeply depressed; beneath densely clothed with fulvous pubescence, dark brown at the apex. B.M.

Male. Length 5–6 lines.—The face clothed with bright pale yellow pubescence, at the insertion of the antennæ it is obscure, on the vertex black; the antennæ filiform, half the length of the thorax, which has a yellowish-brown pubescence on the disk, on the sides and beneath it is cinereous; the wings and legs as in the other sex; the anterior coxæ unarmed; the abdomen oblong-ovate, the two basal segments have a thin pale pubescence, the margins depressed; the intermediate ones have on each side a short pale fringe; the apex inflexed, the margin of the sixth segment emarginate, the seventh entire. B.M.

This is the largest species of the genus found in this country; it is rather more local than *M. Willughbiella*, but in some situations it is tolerably abundant; it occurs in many places near London; it has been taken at Highgate and Hampstead on thistle heads in autumn: it is very plentiful about Battersea, and also at Erith in Kent; it has not occurred in the north of England.

3. Megachile versicolor.

M. cinerascenti-pubescens, abdomine subcordato, segmentorum marginibus albidis; ventre lana versicolori dense vestito.

Megachile versicolor, *Smith, Zool.* ii. 697. 9 ♀.

Female. Length 5 lines.—Black; on each side of the face a little bright pale yellow pubescence; the mandibles very large, produced, the teeth of one fitting into the interstices between those of the opposite mandible; on the cheeks, thorax, and legs the pubescence is cinereous, intermixed with fuscous on the disk of the thorax; wings subhyaline, the nervures black; the tarsi fulvous beneath, the claws ferruginous. Abdomen subcordate, the intermediate segments have laterally a white marginal fringe, the margins of the four basal segments depressed; beneath, the second, third and fourth segments are densely clothed with bright fulvous pubescence, that on the fifth and sixth is black. B.M.

This species very closely resembles *M. centuncularis*, the colour of the pollen-brush being the principal distinctive difference, but it is certainly more than a variety: one specimen occurred at Byfleet near Weybridge: the male will probably be found to be very different from that of *M. centuncularis*. Mr. Walcott has a specimen taken near Bristol.

4. Megachile pyrina.

M. pallide pubescens, thoracis dorso fusco; abdominis segmentis marginibus fulvis. Abdomine *maris* incurvo, ano emarginato; tarsis rufis.

Megachile pyrina, *St. Farg. Hym.* ii. 334. 8 ♂ ♀.
Megachile rufitarsis, *Smith, Zool.* ii. 695. 2 ♂.
Megachile fasciata, *Smith, Zool.* ii. 694. 5 ♀.

Female. Length 5–6 lines.—Black; the face on each side has some rich yellow pubescence, that on the vertex is black. Thorax: the pubescence on the disk short, sparing and black, that on the sides and beneath pale fulvous, the metathorax has a short pale pubescence; the apical joints of the tarsi are ferruginous; the wings subhyaline, their apical margins clouded. Abdomen: the two basal segments thinly clothed with pale fulvous pubescence, on the following segments it is short and fus-

cous, all the segments have a fascia of short fulvous pubescence; beneath, entirely and densely clothed with a golden-yellow pubescence.

Male. Length 5 lines. — The face clothed with bright pale yellow pubescence, the antennæ filiform, the cheeks densely bearded with cinereous pubescence. Thorax: the pubescence on the disk pale ochraceous, on the sides and beneath it is long, dense and cinereous; the tarsi bright ferruginous; the anterior coxæ have a short acute spine. Abdomen: the base and sides have a long pale pubescence, on the third and following segments it is short and fuscous, the apex incurved, the margin of the sixth segment emarginate in the middle and denticulate at the sides, the seventh has a short acute spine in the middle.

Since this species was described in the 'Zoologist,' a fine series of examples have been obtained from France; it is the *M. pyrina* of St. Fargeau; the sexes were captured at different times at Weybridge, but a resemblance of habit was observed in them, and the probability of their being the same species was suggested; such proves to be the case. The species is very common near Paris.

5. Megachile odontura.

M. pallide villosa; abdominis apice denticulato, ano cornuto.

Megachile odontura, *Smith, Zool.* vii. *App.* 58.

Male. Length 4¼ lines.—Black, punctured; the face densely clothed with a rich fulvous pubescence. Thorax clothed with fulvous pubescence, most densely so at the sides; the wings hyaline, faintly clouded at their apical margins, the nervures ferruginous; the femora fringed with long pale pubescence; the anterior tarsi ferruginous, the apex of the basal joint and the second and third palest, the tips of the claws black. Abdomen elongate, obtuse at the apex, the two basal segments thinly clothed with pale fulvous pubescence; the apical margins of the segments have a narrow fascia of pale fulvous pubescence, the bands slightly attenuated in the middle; the margin of the sixth segment denticulate, the seventh produced into a sharp conical spine. B.M.

The unique example of this species is in the collection of the British Museum; the specimen is ticketed No. 262, and on reference to Dr. Leach's manuscript catalogue the following

entry appears: "June: found settling on a foot-path near our house," at Spitchwick, Devonshire. Without hesitation this insect is therefore included as a British species.

6. Megachile argentata.

M. cinereo-villosa, subtus argenteo-villosula, abdominis segmentis marginibus albido fasciatis.

Apis argentata, *Fabr. Ent. Syst.* ii. 336. 96 ♀.
Anthophora argentata, *Fabr. Syst. Piez.* p. 377. 22.
Panz. Faun. Germ. 99. 16.
Apis Leachella, (*Kirby's MSS.*) *Steph. Syst. Cat.* p. 374. 5061.
Megachile argentata, *St. Farg. Hym.* ii. 343. 17.
Spin. Ins. Lig. fasc. i. 140. 9.
Lucas, Explor. Sc. Algér. iii. 196. 123.
Megachile albiventris, *Smith, Zool.* ii. 696. 8.
Megachile Leachella, *Curtis, Brit. Ent.* iv. p. 219.
Nyland. Revis. Ap. Boreal. p. 276. 7.

Female. Length 3¼–4½ lines.—Black: head as wide as the thorax, the face densely clothed at the sides with pale yellow pubescence; the vertex and disk of the thorax have a short thin fuscous pubescence, on the sides and beneath it is cinereous, that on the legs is of the same colour; the wings subhyaline, their nervures black. Abdomen cordate, the apical margins of the segments have a narrow fascia of short white pubescence, the sixth segment has two spots of white pubescence; beneath densely clothed with silvery-white pubescence. B.M.

Male. Length 4 lines.—Head wider than the thorax, the face densely clothed with pale fulvous pubescence, the antennæ filiform. Thorax clothed above with pale fulvous pubescence; the anterior coxæ armed with an obtuse tooth, the femora dilated and concave beneath at their apex; the tarsi have glittering silvery pubescence above, and golden-yellow beneath, the claws ferruginous, their tips black; wings as in the female. Abdomen short, obtuse at the apex, rather widest at the base, the margins of the segments have a narrow fascia of pale pubescence, the sixth segment entirely clothed with short pale pubescence, its margin deeply emarginate in the middle and more or less denticulate on each side, the margin of the seventh segment entire. B.M.

This is a very local species; it occurs at Weybridge and at Southend. It is a very active little insect; its flight and hum are exactly like that of a *Saropoda*; it makes a piping sound

extremely shrill and acute; it is only to be found in the brightest and hottest sunshine in July and August; it frequents the flowers of the *Echium vulgare*. In one respect it differs from its congeners, its labium being nearly twice as long as the palpi.

Mr. S. Stevens took this little bee at Little Hampton, Sussex. When first disclosed the pubescence of the male is golden-fulvous, but it soon fades from exposure.

Div. II.—*Anterior tarsi of the males dilated.*

7. Megachile circumcincta.

M. pallide flavo-villosa; capite anoque atris; antennis *maris* articulo ultimo subdilatato; tarsis anterioribus dilatato-ciliatis.

Apis circumcincta, *Kirby, Mon. Ap. Angl.* ii. 246. 45. t. 16. f. 10 ♀.
Megachile circumcincta, *St. Farg. Hym.* ii. 335. 9.
Smith, Zool. ii. 693. 3 ♂ ♀.
Nyland. Ap. Boreal. p. 103 ♀.

Female. Length 5½ lines.—Black; the face clothed with dark brown pubescence, which is longest at the sides. The thorax and two basal segments of the abdomen clothed with pale fulvo-ochraceous pubescence, on the disk of the former it is more or less fuscous; the pubescence on the legs is pale above, that on the tarsi beneath bright fulvous; the wings hyaline, faintly clouded at their apical margins; the third and following segments of the abdomen have a black pubescence; beneath, the pubescence is bright fulvous at the base, that on the two apical segments being black. B.M.

Var. β. Only the basal segment of the abdomen having pale pubescence.

Var. γ. The three basal segments having pale pubescence.

Male. Length 4½–5 lines.—The face clothed with pale fulvous and the vertex with dark brown pubescence; the thorax has a reddish-brown pubescence above, that on the sides and beneath is cinereous; the anterior femora densely fringed with griseous pubescence, intermixed with pale fulvous, the coxæ armed with an obtuse tooth, the tarsi nearly white, dilated, and fringed with pale pubescence, the first joint elongate and broadest at its apex, the second small and somewhat heart-shaped, the two following minute; the claws ferruginous, their tips black; the intermediate and posterior legs have a long cinereous pubes-

cence. Abdomen short, blunt at the apex, thinly clothed with long pale pubescence, intermixed with fuscous towards the apex; the apical margin of the sixth segment emarginate, and its inflexed margin having an angular tooth on each side; the seventh segment has a single central obtuse tooth. B.M.

This species is local, and is not often met with near London; its colonies are formed in sunny banks: it is plentiful in Hampshire and in many parts of Surrey. It has not been received from the north of England.

8. Megachile Willughbiella.

M. fulvescenti-pubescens; abdomine brevi, ano nigro; antennis *maris* articulo ultimo compresso, dilatato; tarsis anterioribus dilatato-ciliatis.

Apis Willughbiella, *Kirby, Mon. Ap. Angl.* ii. 233. 41.
Megachile Willughbiella, *Latr. Hist. Nat.* xiv. 57. 11.
Curtis, Brit. Ent. iv. t. 218.
St. Farg. Hym. ii. 333. 5.
Smith, Zool. ii. 691. 1.
Nyland. Ap. Boreal. p. 256. 2 ♂, not the ♀.
Megachile fulviventris, *Zett. Ins. Lapp.* p. 465. 2.
The Willow Bee, *Ray's Letters*, p. 72, 74.

Female. Length 6–7 lines.—Black: head as wide as the thorax, the face clothed with dark fulvous pubescence, the vertex with black, and the cheeks with pale ochraceous; the mandibles stout, prominent and quadridentate, the two apical teeth acute, the inner pair obtuse. Thorax shining; above, clothed with a rufo-fulvous pubescence, at the sides and beneath it is paler; the wings subhyaline, the apical margins faintly clouded, the nervures and tegulæ black; the legs have a short fulvous pubescence, that on the tarsi beneath ferruginous, the calcaria and claws ferruginous, the latter black at their tips. Abdomen subcordate; the three basal segments have a pale fulvous pubescence, that on the apical segments is much shorter, and black; the fourth and fifth segments have a narrow fringe of white pubescence; the pollen-brush on the abdomen beneath is black at the sides and at the apex, and fulvous in the middle. B.M.

Male. Length 5–6 lines.—The face has a pale fulvous pubescence, that on the clypeus very bright and glittering; the antennæ half the length of the thorax, the apical joint compressed,

wider than the other joints. Thorax: the pubescence fulvous above, griseous beneath; the anterior legs have a stout acute spine on the coxæ, the femora are dilated, and of a pale testaceous-yellow, having two longitudinal ferruginous stripes beneath; the tibiæ beneath, and the tarsi are pale testaceous; the tibiæ have a bent spine at their apex in front; the basal joint of the tarsi as broad as the tibiæ, the three following joints transverse, gradually narrowing to the apical joint, the tarsi densely fringed with a pale glittering curled pubescence, which has a ferruginous stain beneath; the claws pale ferruginous, their tips black; the intermediate and posterior legs have a loose cinereous pubescence, the posterior tibiæ slightly bent, the claws ferruginous, the tips black. Abdomen subquadrate, the pubescence loosely scattered and pale fulvous; the apex inflexed, emarginate, the seventh segment armed with three short angular teeth. B.M.

This is the most abundant species of the genus found in England, and appears to be generally distributed. It occurs in all parts of the country. The popular name of the Willow Bee is certainly very appropriate. Some years ago, when decaying willows were numerous in the Battersea Fields, the old stumps were perforated with innumerable burrows formed by this species. Mr. Kirby also quotes a passage from a note by Sir John Hill, in his translation of Swammerdam, where he says he has seen thousands of the nests of this bee in Lincolnshire, in the old willow-trees.

9. Megachile maritima.

M. pallide pubescens; thoracis disco fusco-ferrugineo; mandibulis magnis, prominentibus; abdomine oblongo-cordato; segmentorum marginibus albicantibus. *Mas,* pedibus anticis dilatato-ciliatis, tibiis posticis clavatis, ano emarginato.

Apis maritima, *Kirby, Mon. Ap. Angl.* ii. 242. 43 ♀.
Apis lagopoda, *Panz. Faun. Germ.* 55. 7, nec *Linn.*
Anthophora lagopoda, *Fabr. Syst. Piez.* p. 374. 9.
Megachile maritima, *Smith, Zool.* ii. 692. 2 ♂ ♀.

Female. Length 6–7 lines.—Black; the face densely clothed with bright golden-fulvous pubescence, above the insertion of the antennæ it is fuscous, as is also that which fringes

the margin of the vertex; the mandibles very stout and prominent, quadridentate, the two apical teeth rounded, the inner teeth obtuse. Thorax: the pubescence on the disk fusco-ferruginous, at the sides it is pale fulvous; the wings subhyaline, their apical margins faintly clouded, the nervures and tegulæ rufo-piceous; the legs have a short glittering pale pubescence, the tarsi beneath golden-fulvous; the calcaria and claws ferruginous, the latter black at their tips. Abdomen oblong-ovate, the base having a long pale fulvous pubescence, towards the apex the segments have a short black pubescence, the apical margins of the segments have a narrow pale marginal fringe, usually more or less interrupted on the basal segments; beneath densely clothed with bright fulvous pubescence, at the extreme apex it is fuscous. B.M.

Male. Length 6–7 lines.—The face clothed with bright golden-yellow pubescence; the antennæ having the apical joint compressed and dilated; the inferior margin of the mandibles rufo-testaceous. Thorax: the disk clothed with fulvo-ochraceous pubescence, that on the sides and beneath much paler; the anterior coxæ armed with an obtuse tooth, which has a minute acute spine or point at its apex; the coxæ and trochanters have a long dense fringe of very pale yellow pubescence; the femora and tibiæ pale in front, the former having a longitudinal stripe in the middle and also the margins, rufo-piceous; the margins of the tibiæ rufo-piceous; the tibiæ are black above towards the base, and pale at the apex; the tarsi broadly dilated, the basal joint broader than the tibiæ, produced and rounded at its apex in front; the second, third and fourth joints transverse, gradually narrowing to the width of the apical or claw-joint, the whole having a dense pale yellow fringe behind, the margin of which has a ferruginous stain; the posterior tibiæ incrassate, bent inwards; the tarsi also bent, the joints short and stout, the basal one dilated. Abdomen oblong-quadrate, having a pale fulvous pubescence; the sixth segment has a deep depression in the centre, its apical margin emarginate in the middle, the sides crenulated; the margin of the seventh segment has a minute tooth on each side. B.M.

At the time when I first described this species in the 'Zoologist' in 1844, I had not seen a specimen of the true *M. lagopoda*, and was led to believe that it was synonymous with the present species; it appeared possible that Mr. Kirby might have viewed the specimen from above, and thus overlooking the dilatation of the apical joint of the antennæ, had in mistake described *M. la-*

gopoda as having filiform antennæ; such however is not the case. Dr. Nylander has forwarded specimens of the true *lagopoda*, which are quite distinct from *M. maritima*.

This species is very local; it has been once taken at Hampstead, but the back of the Isle of Wight is its metropolis; during the month of July it abounds in Sandown Bay, in company with its parasite, *Cœlioxys Vectis*: numbers of the females were observed cutting off portions of the leaves of a species of *Salix*.

Genus 9. ANTHIDIUM.

Apis, pt., *Linn. Syst. Nat.* i. 953 (1766).
Megachile, pt., *Latr. Hist. Nat.* xiv. 51 (1805).
Anthidium, *Fabr. Syst. Piez.* p. 364 (1804).
Trachusa, pt., *Jurine*, 252 (1809).

The body usually adorned with yellow spots or stripes. Head nearly as wide as the thorax; the ocelli placed in a triangle forward on the vertex; the antennæ filiform, the basal joint of the flagellum obconical. The mentum linear, elongate and pointed at its apex; the labium elongate, blunt at its apex and channeled down the middle, one-third longer than the palpi; the latter four-jointed, the first and second joints elongate, gradually narrowed from the base to the apex; the two apical joints minute, placed at the side and near the apex of the second joint. The maxillary palpi consisting of one joint, placed on a cup-shaped basal tubercle (or joint?); the apical lobe of the maxillæ sickle-shaped. The superior wings having one marginal and two submarginal cells, the second submarginal cell receiving the first recurrent nervure a little within at the base, the second recurrent nervure uniting with the second transverse nervure. Abdomen incurved, furnished with a dense pollen-brush beneath in the females; the males having the apex armed with spines.

Although the species belonging to this genus are numerous, and are found both in the Old and New World, there is only one found in this country, *Anthidium manicatum*; this is truly a summer bee, not making its appearance before the latter part of June or beginning of July. This insect, as far as

my own observation has enabled me to ascertain, does not construct its own burrow, but makes use of any hole which is adapted for its purpose. I once detected a bee entering the hole above the wheel of the sash-line in a summer-house; but its nests are most commonly formed in the holes bored in old willow stumps by *Cossus ligniperda*: formerly they were easily obtained in Battersea Fields, where old willows abounded. It is probable that when the parent insect has selected one of these ready-formed tunnels, she enlarges the end used as the depository of the nest, and this is easily effected, as the stumps in question, at the depth of a couple of inches, consist of soft decayed wood; the chamber being formed, the bee collects a quantity of down from woolly-stemmed plants, with which she forms an outer coating; she then constructs a number of cells for the reception of the pollen or food of the larva; they consist of a woolly material, mixed with some glutinous matter which resists the moisture of the food it contains, and in which the larva on being full-fed spins a brown silken cocoon: these bees pass the winter in the larva state, and do not appear until midsummer. In one respect the sexes of this genus differ from most other bees, the males being much larger than the females: they copulate while flying in this genus as well as in *Anthophora*.

1. Anthidium manicatum.

A. albido-villosum; abdomine maculis flavis lateralibus; ano *maris* inflexo, quinquedentato.

Apis manicata, *Linn. Faun. Suec.* 1701; *Syst. Nat.* i. 958. 28 ♂.
Fabr. Syst. Ent. 384. 35; *Ent. Syst.* ii. 330. 73.
Schäff. Icon. Ins. t. 32. f. 11, 12.
Rossi, Faun. Etrusc. ii. 103. 914.
Christ. Hym. p. 133. t. 9. f. 5.
Kirby, Mon. Ap. Angl. ii. 248. 47. t. 16. f. 12 ♀, 13 ♂.
Don. Brit. Ins. xiv. p. 57. t. 489.
Anthidium manicatum, *Fabr. Syst. Piez.* p. 364. 1.
Curtis, Brit. Ent. iv. t. 61.
Latr. Ann. Mus. Hist. Nat. xiii. 212. 5.
St. Farg. Hym. ii. 355. 4.
Smith, Zool. iv. 1452. 1.
Nyland. Ap. Boreal. p. 265. 22.
Apis maculata, *Fabr. Ent. Syst.* ii. 332. 77, var. ♀; *Syst. Piez.* 365 (var. β. A. manicatum, fœmina).
Panz. Faun. Germ. 7. 14.

Female. Length 4½–5 lines. — Black; the clypeus and face on each side yellow, the clypeus has a broad longitudinal stripe, and the base black; its anterior margin is minutely denticulate; the mandibles and a lunate spot on the vertex behind the eyes yellow, the former black at their apex; the face has a thin short flavo-griseous pubescence. Thorax: the disk has a sparing fusco-ferruginous pubescence, that on the sides and beneath griseous; the wings fusco-hyaline, the nervures and tegulæ black, a minute yellow spot on the latter in front; the tibiæ have a yellow line above, sometimes interrupted in the middle; the tarsi densely covered with a short yellowish-white pubescence above, with golden-yellow beneath. Abdomen: each segment has at its lateral margins an ovate yellow macula, those on the fourth and fifth are frequently elongated and transverse, these stripes sometimes interrupted, forming two spots on each side; the apical segment has the two spots beneath, the pubescence is dense, pale and glittering. B.M.

Male. Length 5–8 lines.—Black; the clypeus, the face on each side, the mandibles, and a spot on the vertex above the eyes, yellow; the clypeus has a trident-shaped black macula at its base, and the mandibles have their tips black; the face and cheeks have a cinereous pubescence, that on the vertex and on the disk of the thorax is fulvo-ochraceous; the tegulæ in front and behind, and the tubercles behind, yellow; the wings as in the other sex; the anterior and intermediate tibiæ are yellow at their apex; the thorax at the sides and beneath, and the femora, have a cinereous pubescence; the tarsi are densely covered and fringed behind with silvery-white pubescence; the basal joint of the two anterior pairs yellow; sometimes the posterior tibiæ have a yellow spot at their base, and occasionally at their apex also; their pubescence silvery, having a golden tinge above. Abdomen variable in its markings, having a lateral ovate spot on the four basal segments, a minute one on the fifth, and two central transverse marks on the fifth and sixth; the sixth having on each side a stout bent acute tooth, the seventh an obtuse one on each side, and a minute slender one in the middle; the base has a thin cinereous pubescence, and at its extreme lateral margins a tuft of silvery pubescence; the following segments have a pale fulvous fringe. B.M.

β. The seventh segment has sometimes two large transverse spots, those on the sixth being obsolete.

γ. The apical transverse spot obsolete.

The variations in the markings to which this insect is subject

are very numerous. Latreille in his Monograph on the genus* has enumerated nine or ten varieties; these include the *A. maculata* of Panzer, which is very rare in this country; this variety has on each segment a transverse yellow band, interrupted in the middle; only two instances are known of its having been taken in England; one specimen is in the collection of Mr. Desvignes; it was captured in Scotland; and the other is in the cabinet of Mr. Brown of Burton on Trent. It is very singular that the variety which is rare in England should be the most abundant one in France, our form being there very rare. This insect is very abundant in the London district, but it appears to be scarce in the north.

This is the wild bee which White in his 'History of Selborne' has so well described in the following words:—"There is a sort of wild bee frequenting the garden-campion for the sake of its tomentum, which probably it turns to some purpose in the business of nidification. It is very pleasant to see with what address it strips off the pubes, running from the top to the bottom of a branch, and shaving it bare with the dexterity of a hoop-shaver. When it has got a vast bundle, almost as large as itself, it flies away, holding it secure between its chin and its fore legs."

Genus 10. CHELOSTOMA.

Apis, pt., *Linn. Faun. Suec.* 419 (1761).
Hylæus, pt., *Fabr. Ent. Syst.* ii. 303 (1793).
Anthophora, pt., *Fabr. Syst. Piez.* p. 372 (1804).
Megachile, pt., *Latr. Hist. Nat.* xiv. 51 (1805).
Chelostoma, *Latr. Gen. Crust. et Ins.* iv. 161 (1809).
Heriades, pt., *Zett. Ins. Lapp.* p. 467 (1840).

Head quadrate, usually wider than the thorax; the antennæ not longer than the head in the *female*, the flagellum clavate; half as long as the thorax, slender and filiform in the *male*. The labrum elongate, narrowed anteriorly, and truncate at the apex; the mandibles bidentate at their apex and densely ciliated with hairs on their inner margin; the ocelli placed in a triangle, the posterior pair in a line with the vertex of the eyes. The labial palpi four-jointed, the basal joint about one-third the length of the second, the second joint somewhat attenuated at the apex, the third placed in a line with it, short, the fourth

* Ann. Mus. Hist. Nat. xiii. p. 212. 5.

joint clavate-truncate, attached to its side near the apex. The maxillary palpi three-jointed. The anterior wings have one marginal and two submarginal cells; the second submarginal receiving the two recurrent nervures. Abdomen sublinear, slightly narrowed towards the base; furnished in the female with a dense scopa of pubescence. In the male, the abdomen is incurved and dentate at the apex.

This genus is very closely related to *Heriades*, and on a careful examination of the parts of the mouth it will be found that the *A. campanularum* belongs to the genus *Chelostoma*; the maxillary palpi are three-jointed in both genera; but the labial palpi are differently formed, although consisting of the same number of joints, as will be seen on a reference to the figures; the wings are the same in both genera.

The species of the genus *Chelostoma* form their burrows in decaying posts, rails, &c.; but when they chance to meet with ready-formed tubes, like other bees, as we have shown, they have the sagacity to avail themselves of such conveniences. Some years ago I found a colony of these bees in the straw tubes of a thatched barn; and similar examples are to be seen amongst the collection of nests of hymenopterous insects in the British Museum. In the observations on the genus *Osmia* is given an account of the operations of these bees, and it is only necessary to add some notice of the parasites and enemies by which their broods are attacked. Mr. Marsham* gives an account of the proceedings of *Pimpla manifestator* introducing its eggs into the nests of these bees, but it is scarcely proved that the larva of *Chelostoma* was the object of attack: when we take into consideration the size of the parasitic larva and that of the bee, we are inclined to suspect that the *Pimpla's* attack was upon some other insect. Where colonies of this bee are met with in posts and rails, there are usually also two Coleopterous insects, *Melandrya caraboides* and *Clytus arietis*, depositing their eggs; they may be frequently observed thrusting their ovipositors, or elongated apical segment of the abdomen, into the burrows of the bees; this is probably merely for the purpose of introducing them into the wood in a suitable situation, the larva of both beetles feeding on the wood: it is possible that *Pimpla* attacks the larva of one of these insects, and not that of *Chelostoma*. The only Ichneumon which I know from observation to be a parasite on *Chelostoma* is *Fœnus assectator*: this insect has more

* Trans. Linn. Soc. iii. 26.

than once been bred from its nests. The parasite enters the burrows; it does not introduce its ovipositor, or its abdomen, but enters and disappears in search of its victim. *Chrysis ignita* and *C. cyanea* have been reared from the nests of this bee. Mr. Kirby mentions, in connexion with his description of the bee, *Ichneumon femorator*, which his friend Mr. Trimmer found in the nest of *Chelostoma*; and he also observes, that Bergman records the fact of *Ichneumon* (*Fœnus*) *jaculator* being parasitic upon these bees; it may be frequently observed about the burrows of *Chelostoma*.

1. Chelostoma florisomne.

C. atrum, glabriusculum; mandibulis prominentibus, intus barbatis, abdominis segmentis marginibus albis. *Mas*, cinereo-villosus; abdomine incurvo, ventre basi cornuto, ano bidentato.

Apis florisomnis, *Linn. Faun. Suec.* p. 413 (1704); *Syst. Nat.* i. 954. 13, ♂ *Cab. Mus. Linn. Soc.* ♂.
Scop. Ent. Carn. p. 299. 796. f. 796.
Fabr. Syst. Ent. p. 387. 55.
Kirby, Mon. Ap. Angl. ii. 253. 49.
Apis maxillosa, *Linn. Syst. Nat.* i. 954. 11 ♀, ♂ *Cab. Mus. Linn. Soc.*
Fabr. Mant. i. 305. 86.
Kirby, Mon. Ap. Angl. ii. 251. 48.
Hylæus florisomnis, *Fabr. Ent. Syst.* ii. 304. 5; *Syst. Piez.* p. 319. 3.
Panz. Faun. Germ. 46. 13.
Hylæus maxillosus, *Fabr. Ent. Syst.* ii. 303. 4 ♀.
Panz. Faun. Germ. 53. 17.
Anthophora truncorum, *Fabr. Syst. Piez.* p. 379. 29, var. ♀.
Megachile maxillosa, *Latr. Hist. Nat.* xiv. 51. 1 ♂ ♀.
Megachile florisomnis, *Spin. Ins. Lig.* fasc. i. 134. 1.
Chelostoma maxillosa, *Latr. Gen. Crust. et Ins.* iv. 162.
Brullé, Expéd. Sc. de Morée, iii. 342. 757.
St. Farg. Hym. ii. 407. 1.
Chelostoma florisomnis, *Curtis, Brit. Ent.* xiv. t. 628 ♂.
Smith, Zool. iv. 1445. 1.
Heriades maxillosa, *Zett. Ins. Lapp.* p. 467. 1.
Nyland. Ap. Boreal. p. 268. 1; *Revis. Ap. Boreal.* p. 277. 2.

Female. Length 3–5 lines.—Black, shiningand punctured; the face having a little white pubescence on each side, the anterior margin of the clypeus produced, forming a flattened projecting plate or tubercle; the thorax has a few pale scattered hairs at the sides; the legs have a short silvery-white pubescence,

that on the tarsi beneath fulvous; wings subhyaline, their apical margins having a narrow fuscous cloud, darkest at the tips of the anterior pair. Abdomen cylindric, the apical margins of the segments have a narrow fascia of short snow-white pubescence; beneath, densely clothed with glittering pale yellowish-white pubescence. B.M.

Male. Length 4–5 lines.—Black; the face densely clothed with fulvo-ochraceous pubescence, the mandibles bidentate and fringed beneath with long pale ochraceous hairs, the cheeks forming an obtuse tooth or prominence at the base of the mandibles; the flagellum has its intermediate joints produced or subdentate beneath. Thorax thinly clothed with pale ochraceous pubescence; wings as in the other sex. Abdomen thinly covered with pale ochraceous pubescence, the margins of the intermediate segments fringed with similar hair; the abdomen is elongate, linear, and bidentate at the apex, very much incurved; beneath, the second segment produced into the shape of a horse-shoe, concave within; the fourth segment is deeply concave, the margin ciliated with bright yellow pubescence, the apical segment has a bifid tubercle beneath. B.M.

This insect is found in all parts of the country, in fact throughout Europe. It is very probable that a species described by Nylander, *C. nigricornis*, will be discovered in this country; it closely resembles the present species, but the female wants the tubercle on the clypeus, and the apex of the abdomen of the male is slightly rounded, and subdentate laterally; it is common in France. *Chelostoma* usually appears about the end of May; the males may frequently be found enclosed in the petals of flowers, in which they pass the night.

2. Chelostoma Campanularum.

C. atrum, glabriusculum; ano *maris* inflexo, acute bidentato, ventris basi gibba.

Apis Campanularum, *Kirby*, *Mon. Ap. Angl.* ii. 256. 50. t. 16. f. 14 ♀, 15 ♂.
Megachile Campanularum, *Latr. Hist. Nat.* xiv. 52. 2.
Heriades campanularum, *Spin. Ins. Lig.* fasc. ii. 198. 1.
St. Farg. Hym. 405. 2.
Smith, Zool. iv. 1448. 2.
Nyland. Ap. Boreal. p. 273. 6.
Apis florisomnis minima, *Christ, Hym.* 197. t. 17. f. 18.

Female. Length 2¼–2½ lines.—Black, shining, closely and finely

punctured; the mandibles bidentate, ferruginous at their apex. Thorax having a little hoary pubescence at the sides; the wings subhyaline and iridescent; the legs have a slight scattered hoary pubescence, the tarsi beneath fulvous, the claws ferruginous; the calcaria pale testaceous. Abdomen cylindric, obtuse at the apex, densely clothed beneath with pale yellow pubescence. B.M.

Male. Length 2–2¼ lines.—Closely resembling the female, but the flagellum is filiform and longer than the head; the face has a white pubescence; the abdomen is incurved at the apex and bidentate; beneath, the second segment has an elevated tubercle, and the fifth is concave and clothed with pale pubescence. B.M.

This species is rather local, but very abundant in many situations; it frequents the Hare-bell (*Campanula rotundifolia*), and may be captured in the flowers sometimes in plenty.

Genus 11. HERIADES.

Apis, pt., *Linn. Faun. Suec.* p. 419 (1761).
Hylæus, pt., *Fabr. Ent. Syst.* ii. 302 (1793).
Anthophora, pt., *Fabr. Syst. Piez.* 372 (1804).
Heriades, pt., *Spin. Ins. Lig.* fasc. ii. 8 (1808).
Chelostoma, pt., *Latr. Gen. Crust. Ins.* iv. 161 (1809).

The labial palpi four-jointed, the basal joint not quite half the length of the second, the third and fourth joints minute, placed at the side and near the apex of the second joint. The maxillary palpi three-jointed, the two basal joints stout, the apical joint cylindric, slender and pointed at the apex. The wings as in the genus *Chelostoma*.

This genus only differs from *Chelostoma* in having two minute apical joints to the labial palpi, which are placed near the apex of the second joint at its side. *Chelostoma* has only one minute apical joint, the third being attached to the apex of the second, and in a line with it; in other respects they coincide. Latreille says the maxillary palpi are two-jointed, and Mr. Curtis has figured them so; but this is a mistake,—they are distinctly three-jointed. Mr. Curtis has also figured the labial palpi three-jointed, but they are really four-jointed; probably the

apical joint was broken off in his specimen, and the species being rare, he had not the means of comparison with others.

1. Heriades truncorum.

H. atra; abdominis basi transverse carinata, segmentorum marginibus albidis; ano *maris* inflexo, inermi.

Apis truncorum, *Linn. Faun. Suec.* 1692; *Syst. Nat.* i. 955. 15, & *Cab. Mus. Linn. Soc.* ♀.
Kirby, Mon. Ap. Angl. ii. 258. 51 ♂ ♀.
Hylæus truncorum, *Fabr. Ent. Syst.* ii. 305. 9.
Megachile truncorum, *Latr. Hist. Nat.* iv. 52. 3.
Heriades truncorum, *Spin. Ins. Lig.* fasc. ii. p. 9.
Curtis, Brit. Ent. xi. t. 504.
St. Farg. Hym. ii. 404. 2.
Zett. Ins. Lapp. p. 467. 1.
Smith, Zool. iv. 1447. 1.
Nyland. Ap. Boreal. p. 271. 4, & *Revis. Ap. Boreal.* p. 278.

Female. Length 3 lines.—Black, closely and strongly punctured; the head subquadrate, as wide as the thorax; the face has on each side a little white pubescence; the clypeus rounded in front, its margin subserrate; the posterior inner margin of the cheeks bidentate. Thorax: the wings slightly fuscous, the calcaria and the claws ferruginous, the tarsi fulvous beneath; the apical margins of the segments of the abdomen have a narrow snow-white fascia; beneath densely clothed with yellow pubescence. B.M.

Male. Length 3 lines.—Closely resembling the female; the face clothed with silvery-white pubescence; the antennæ filiform, longer than the head; the abdomen inflexed, the sixth segment has its margin entire; the seventh compressed, and having on each side a deep transverse fovea; the basal segments beneath fringed with white pubescence, the third densely so, the following deeply concave. B.M.

Mr. Kirby mentions the neighbourhood of Brentford as the locality for this species—Mr. Trimmer found it there. I have several times in the month of June searched in that locality in vain, but doubtless others might be more fortunate; it appears to be plentiful near Paris, and is considered on the Continent not at all a rare insect. Three or four specimens were detected in Mr. Ingall's collection, of his own capturing, but he does not remember the precise locality.

Genus 12. CERATINA.

Hylæus, pt., *Fabr. Ent. Syst.* ii. 302 (1793).
Apis, pt., *Fabr. Ent. Syst. Supp.* 273 (1796).
Megilla, pt., *Fabr. Syst. Piez.* 293 (1804).
Prosopis, pt., *Fabr. Syst. Piez.* 293 (1804).
Ceratina, *Latr. Hist. Nat.* xiv. 50 (1805).

Head transverse, the ocelli placed in a triangle on the vertex; the labrum subquadrate; the mandibles short and stout, tridentate at their apex. The labial palpi four-jointed, the two basal joints elongate, the third and fourth minute, placed at the side and near the apex of the second joint. The maxillary palpi six-jointed, the three basal joints of about equal length, subclavate, the apical joints minute. The superior wings with one marginal and three submarginal cells; the second submarginal cell receiving the first recurrent nervure a little beyond the middle, the third submarginal receiving the second recurrent nervure also beyond the middle. Abdomen clavate.

All authors appear to have observed only three joints in the labial palpi; the number is certainly four. Latreille mistook the number, and others have followed him in the error.

Entomologists have been divided in their opinions respecting the habits of this genus of Bees. Spinola states, in a memoir published in the Annales du Muséum d'Hist. Nat. 1807, on the economy of *Ceratina*, that they excavate the pith from brambles and briars, and supply their larva with a deposit of semi-fluid honey: this is the correct history of their economy. Some years ago I observed a small bee most industriously employed in excavating a dead bramble-stick; my attention was directed to the circumstance from observing some of the fallen pieces of pith on the ground immediately beneath; occasionally fresh quantities of dust were pushed out; at length the little creature came out of the stick as if to rest, and after sunning itself a few minutes, it re-entered and again commenced its labours: later in the day, after stopping up the entrance, I cut off the branch, and found in it a male and female of *Ceratina*.

St. Fargeau was led to regard the bees of this genus as parasitic, from the circumstance of their being destitute of pollinigerous appendages; such is also the case with the genera *Prosopis* and *Sphecodes*; these also were regarded by that author as parasites. Observation alone can be relied upon when the

history of an insect is to be written; all classification based upon structural differences alone will frequently be at fault. Time and united observation will one day complete the history of the Hymenoptera.

1. Ceratina cærulea.

C. cæruleo-virens, glabriuscula, cylindrica; abdomine clavato. *Mas,* ore albo.

Apis cærulea, *Vill. Ent. Europ.* iii. 88. t. 8. f. 25 ♂.
Apis cucurbitina, *Rossi, Mant.* i. 145. 325.
Apis callosa, *Fabr. Ent. Syst. Supp.* v. 277. 122–3.
Apis cyanea, *Kirby, Mon. Ap. Angl.* ii. 308. 71. t. 17. f. 7 ♀, 8 ♂.
Megilla callosa, *Fabr. Syst. Piez.* p. 328. 31.
Ceratina callosa, *Latr. Gen. Crust. et Ins.* iv. 160.
Ceratina nitidula, *Spin. Ins. Lig.* fasc. i. 151. 2 ♂.
Ceratina cyanea, *St. Farg. Hym.* ii. 505. 1.
Ceratina cærulea, *Smith, Zool.* iv. 1448. 1.

Female. Length 2¼–3 lines.—Blue, shining and closely punctured; the labrum and mandibles black, the latter ferruginous at their apex, which is armed with three teeth, the central tooth the longest; the flagellum piceous beneath. Thorax with a central longitudinal impressed line, and two short smooth lines on each side; the wings subfuscous, beautifully iridescent. Abdomen: the margins of the three basal segments depressed, the apex obtuse, the sixth segment with a central carina, pointed at the apex. B.M.

Var. *a.* The clypeus with a yellow spot.

Male. Length 2–3 lines.—This sex only differs in having the clypeus and labrum white; the latter has a minute black dot in the middle at the base, and another on each side at the middle of its margin. The thorax, wings and legs as in the female. Abdomen having at the apex of the sixth segment in the middle a short elevated carina; the seventh incurved, produced at its apex into an elevated plate which is notched in the middle. B.M.

This is a very local species, and is to be obtained most easily by collecting in the winter all the perforated bramble-sticks that can be found in the localities where it is known to have been met with. It has been taken in a field close to Charlton Church, at the entrance to the village, and is also found at Birch Wood; it frequents the flowers of the *Echium vulgare.* It is found not

uncommonly in the neighbourhood of Bristol by Mr. Walcott, who has industriously collected the bees of that neighbourhood, and has met with many rarities which he has presented to the British Museum.

2. Ceratina albilabris.

C. nigra, clypeo et labro macula alba ornatis. *Mas*, clypeo et labro totis albis.

Hylæus albilabris, *Fabr. Ent. Syst.* ii. 305. 10.
Prosopis albilabris, *Fabr. Syst. Piez.* p. 293. 2.
Ceratina albilabris, *Latr. Gen. Crust. et Ins.* i. t. 14. f. 11.
Jurine, Hym. p. 234.
Spin. Ins. Lig. fasc. i. 151. 1.
St. Farg. Hym. ii. 506. 2. t. 19. f. 1 ♀, 2 ♂.
Smith, Zool. vii. *Append.* 57.

Female. Length 2½ lines.—Black, shining and punctured; the clypeus and the labrum more or less white, the spots varying in different individuals; the tubercles and a minute spot at the base of the tibiæ white; the wings subhyaline and iridescent; the abdomen clavate, the margins of the segments piceous; the abdomen is sometimes dark brown. B.M.

The male only differs in having the clypeus and labrum entirely white; the abdomen incurved and truncate at the apex.

This species is included amongst the British bees with some hesitation. A specimen of the female is placed in the collection of the British Museum, having a ticket attached, bearing the number 236; on reference to Dr. Leach's MS. Catalogue, the following entry is found: "June 4th, 236, taken in Tothill Lane," Devonshire: the entry does not indicate whether the number refers to an hymenopterous insect or not. Future investigation will probably remove all doubts of its being indigenous.

Subfamily 4. SCOPULIPEDES, *Latr.*

Genus 13. EUCERA.

Apis, pt., *Linn. Faun. Suec.* p. 419. no. 1684 (1761).
Eucera, *Scop. Ann. Hist. Nat.* iv. 8 (1769).

Head transverse, the ocelli placed in a slight curve on the vertex; antennæ filiform, the first joint of the flagellum twice

the length of the second and following joints, which are of about equal length, the first joint slender at its base. The labial palpi four-jointed, the two basal joints elongate, the first joint twice the length of the second, the two apical joints minute, placed at the side and near the apex of the second joint. The labium one-third longer than the palpi; the paraglossæ setiform, elongate and pubescent, nearly as long as the labium, pointed at their apex. The maxillary palpi six-jointed, the basal joint very thick as compared to the following joints, which are slender, subclavate, and each a little shorter than the preceding from the basal to the apical joint. The superior wings with one marginal and two submarginal cells, the second submarginal cell receiving the first recurrent nervure a little within, and the second nervure near its apex; the spines which arm the tibiæ at their apex, simple; the claws bifid. The males have their antennæ as long as the entire body, filiform, the joints arcuate and beautifully reticulated.

Eucera longicornis is the only species of the genus found in this country. Kirby has described four; but the second, "*linguaria*," is only a faded example of the male of *longicornis*; the third, "*pollinaris*," is a North American species, and the fourth, *Druriella*, is a species of *Tetralonia* (*Macrocera*). *Eucera* prefers a clayey soil for its burrows; it forms an oval chamber or cell at the end, the sides of which it renders perfectly smooth, and capable of resisting the moisture of the semi-fluid mixture of pollen and honey which it stores up for its young brood; each cell contains a single larva. Its development is precisely the same as that of the genus *Anthophora*; it undergoes its changes in the same manner; it does not spin a cocoon, but passes the winter in the larva state, changing about the end of April to the pupa, and shortly after arriving at its perfect condition. The pupa throws off a thin transparent shroud. The male on emerging from its cell passes its long antennæ through the notch at the base of the first joint of the anterior tarsus, drawing the antennæ through, and thus readily divests those organs of the thin pellicle in which they are enveloped: here we see another beautiful exemplification of the truth that "nothing is made in vain." The long antennæ of the males of this genus are doubtless adapted to some peculiar phase in their economy, and the remarkable hexagonal reticulation of the joints also answers some purpose connected with a peculiar sense, the exact function of which we are unable to appreciate.

1. Eucera longicornis.

E. nigra, pallide fulvo-villosa; thorace abdominisque basi hirsuto-fulvis. *Mas*, antennis filiformibus longitudine corporis.

Apis longicornis, *Linn. Faun. Suec.* p. 419. no. 1684; *Syst. Nat.* i. 953. 1 ♂, & *Cab. Mus. Linn. Soc.*
Scop. Ent. Carn. p. 298. 794. *f.* 794.
Fabr. Syst. Ent. p. 388. 58.
Schäff. Icon. Ins. t. 44. f. 3.
Fourc. Ent. Par. ii. 446. 10.
Rossi, Faun. Etrusc. ii. 922.
Christ. Hym. p. 142. t. 11. f. 9.
Kirby, Mon. Ap. Angl. ii. 278. 59 ♂ ♀.
Sulz. Gesch. Ins. t. 27. f. 14.
Eucera longicornis, *Scop. Ann. Hist. Nat.* iv. 8. 1 ♂.
Fabr. Ent. Syst. ii. 343. 1.
Latr. Hist. Nat. xiv. 43. 1.
Brullé, Expéd. Sc. de Morée, iii. 334. 742.
Zett. Ins. Lapp. p. 469. 1.
Blanch. Hist. Nat. Ins. iii. p. 407.
St. Farg. Hym. ii. 118. 3.
Lucas, Explor. Sc. Algér. iii. 159. 34.
Smith, Zool. iv. 1449. 1.
Nyland. Ap. Boreal. p. 249. 1.
Bär, Bull. Mosc. xxiii. 530. 1. t. 13. f. 1.
Apis tuberculata, *Fabr. Ent. Syst.* ii. 334. 84 ♀.
Eucera tuberculata, *Panz. Faun. Germ.* 78. 19.
Eucera vulgaris, *Spin. Ins. Lig.* fasc. i. p. 149. 1.
Andrena strigosa, *Panz. Faun. Germ.* 64. 16 ♀.
Ray, Hist. Ins. 243 ♂.
Swamm. Bibl. Nat. t. 26. f. 6 ♂.
Geoff. Ins. Par. ii. 413. 10.

Female. Length 6½–7 lines. — Black: the face and labrum clothed with cinereous pubescence, somewhat fulvous on the labrum anteriorly, the mandibles ferruginous at their apex. Thorax above clothed with fulvous pubescence, on the sides pale yellow, and beneath cinereous; tegulæ and nervures ferruginous, the wings pale fulvo-hyaline; the legs have a fulvous pubescence above, on the tarsi beneath it is ferruginous; the calcaria pale testaceous, the apical joints of the tarsi ferruginous, tips of the claws black. Abdomen broad, subdepressed, at the base thinly clothed with pale fulvous pubescence; the second and third segments have laterally on their apical margins a fascia of very short cinereous pubescence, on the fourth segment an entire fascia, the two apical segments covered with short fulvous pubescence; beneath, the apical segments have a fulvous fringe. B.M.

Male. Length 5–7 lines.—Black: the labrum and clypeus yellow, the pubescence on the face yellowish-white; on the margin of the vertex, disk of the thorax, and two basal segments of the abdomen, it is fulvous; the antennæ as long as the entire insect; the extreme apex of the abdomen fulvous; the wings and legs as in the other sex. B.M.

This insect is found in all parts of the country; it usually makes its appearance about the latter part of May, and in some situations forms large colonies. Few insects are more widely distributed throughout Europe; it is found not only in Southern Europe, but also in Russia, Siberia, Denmark, Sweden and Lapland.

Genus 14. SAROPODA.

Apis, pt., *Panz. Faun. Germ.* fasc. 55. f. 17 (1800).
Anthophora, pt., *Spin. Ins. Lig.* fasc. i. 127 (1806).
Heliophila, *Klug, Illig. Mag.* vi. (nec *Burmann*) (1807).
Saropoda, *Latr. Gen. Crust. et Ins.* iv. 177 (1809).

Head transverse, the ocelli placed in a triangle on the vertex; the antennæ filiform, the basal joint of the flagellum narrowed at the base; the labrum subquadrate, the angles rounded. The labial palpi four-jointed, the basal joint more than six times the length of the second joint, the two apical ones minute, placed in a successive line with the two basal joints; the apical joint very slender, pointed, and minute; the labium about one-third longer than the palpi, and twice the length of the mentum. The maxillary palpi four-jointed; the basal joint one-third the length of the second, the third shorter than the second, and the fourth cylindrical and minute. The superior wings with one marginal and three submarginal cells; the marginal cell rounded at the apex, the second submarginal cell receiving the first recurrent nervure in the middle, the third receiving the second at its apex. Thorax globose. Abdomen subovate, the calcaria simple, the claws bifid.

Of all the busy bees that revel in the beauty of a summer's day, *Saropoda bimaculata* must ever be an especial favourite; it is only to be found when it is sunniest, brightest and hottest—when summer days are summer days indeed. Who has not heard its merry hum? who has not seen it, when for a moment

it settles on a flower, or rests on some sunny bank, panting with delight? The eyes splendid as opals, could their brilliancy be preserved, this bee would rival, and challenge admiration with the most brilliant of its tribe. It is a local species, but abounds in many localities; it flies with incredible swiftness, darting from flower to flower.

We have in this country no other species of the genus *Saropoda*; two other bees have usually been associated with it, but they belong to the genus *Anthophora*. *Saropoda*, as characterized by Latreille, has setiform labial palpi, the joints being consequently continued in a straight line; no other British bee resembles it in this respect.

1. Saropoda bimaculata.

S. nigra, pallide villosa; facie antice, oreque flavescentibus; ano tomentoso-incano. *Mas*, thorace fulvo-villoso, facie immaculata.

Apis bimaculata, *Panz. Faun. Germ.* 55. 17 ♀.
Kirby, Mon. Ap. Angl. ii. 286. 63 ♀.
Apis rotundata, *Panz. Faun. Germ.* 56. 9 ♂.
Kirby, Mon. Ap. Angl. ii. 291. 66.
Anthophora bimaculata, *Spin. Ins. Lig.* i. 127. 6.
St. Farg. Hym. ii. 36. 11.
Heliophila bimaculata, *Klug, Illig. Mag.* vi. 227.
Saropoda bimaculata, *Curtis, Brit. Ent.* viii. t. 361.
Smith, Zool. iii. 891. 1.

Female. Length 4½–5 lines.—Black: the clypeus, labrum and mandibles yellow; the clypeus and the labrum have two quadrate black spots at their base; the tips of the mandibles rufo-piceous. Thorax: the disk clothed with fuscous pubescence, that on its sides and beneath is palish yellow; the legs dark rufo-piceous, clothed above with pale yellowish-white pubescence, at the tips of the femora a little short fulvous pubescence; the wings subhyaline, faintly clouded at their apical margins. Abdomen subglobose, at the base a little pale fulvous pubescence, the second and third segments have a fascia of very short pubescence of the same colour; the two following have a clothing of very short cinereous pubescence, that at the apex is black. B.M.

Male. Length 4½ lines.—Black: the face below the insertion of the antennæ, the scape in front, the labrum and mandibles, yellow, the tips of the latter ferruginous; on the vertex and disk of the thorax the pubescence is fulvous; the wings as in

the female; the claw-joint of the tarsi larger than in the other sex, and dark rufo-piceous; the pubescence on the sides of the thorax, metathorax, and base of the abdomen pale fulvous; all the segments have a narrow fascia of short pubescence of the same colour. B.M.

This species is not found in the immediate vicinity of London. Mr. Kirby observes that he met with it in "a sunny sand-pit near Coomb Wood:" that locality has been searched on many occasions, but without success. It is taken at Weybridge, at Hawley, and other places in Hants, in which county it is very plentiful; it is found in the greatest abundance in Sandown Bay, Isle of Wight, where it literally abounds in the month of July. The *Apis rotundata* of Kirby is *A. bimaculata* in fine condition.

Genus 15. ANTHOPHORA.

Apis, pt., *Linn. Syst. Nat.* i. 953 (1766).
Megilla, pt., *Fabr. Syst. Piez.* p. 328 (1804).
Lasius, pt., *Jurine, Hym.* p. 235 (1807).
Anthophora, *Latr. Nouv. Dict. d'Hist. Nat.* ix. 167 (1803); *Gen. Crust. et Ins.* iv. 174 (1809).

Head transverse, broad, the eyes wide apart; viewed in front, subtrigonate; ocelli placed in a triangle on the vertex; the antennæ have the scape short, about equal in length to the first joint of the flagellum, the radical or intervening joint globose; the first joint of the flagellum elavate, beyond which it is filiform, the joints being of about equal length; the labrum subquadrate, rounded anteriorly. The labial palpi four-jointed, the basal joint thrice the length of the second joint; the two apical joints minute, placed at the side and near the apex of the second joint, which is pointed at its apex; the tongue one-third longer than the palpi, pubescent, particularly towards the apex; the paraglossæ short and lanceolate. Maxillary palpi six-jointed, the basal joint short and stout, the second stouter and longer than the third, the rest each shorter than the preceding. The anterior wings with one marginal and three submarginal cells; the second submarginal narrowed towards the marginal, and receiving the first recurrent nervure a little beyond the middle, the third submarginal of nearly equal width; the second recurrent nervure uniting with the apical nervure of the third submarginal cell;

in some exotic species the recurrent nervure is received a little within; the posterior tibiæ and the basal joint of the tarsi densely pubescent on the outside. Abdomen usually subovate; sometimes densely pubescent, sometimes subpubescent, and having regular bands on the apical margins of the segments.

The genus *Anthophora* is one of great extent, although there are only four British species; it is found in all quarters of the globe. The genus, as at present constituted, contains species of varied habits; *A. furcata* being a wood-burrower*; the rest of the indigenous species burrow in the ground, or in walls and similar situations; *A. acervorum* is sometimes seen in great numbers perforating the mortar of barns and outhouses; its more constant habit is to burrow in banks; many parts at the back of the Isle of Wight have the cliffs completely riddled with their burrows. They are subject to the attacks of various parasites and other destroyers; of the latter kind nothing can surpass the wholesale slaughter committed on their broods by the common earwig; this destructive insect penetrates their burrows and devours the food laid up for the progeny of the bee, and there is reason to believe that they also destroy the pupæ; they appear to be omnivorous, and to devour alike pollen, honey, pupæ, and perfect insects.

Of the insects which are parasitic on *A. acervorum* in the larva state, the first which claims notice is a species belonging to the *Chalcididæ*, of the genus *Melittobia* of Westwood, with which the genus *Anthophorabia* of Newport is synonymous. The latter gentleman published a valuable and highly interesting memoir on this parasite in the 'Linnæan Transactions,' vol. xxi. p. 63.

In the autumn of 1853 I had the pleasure of finding this interesting parasite in the cells of *Anthophora*. The female is a minute shining dark green insect, not more than half a line in length; the male is equally minute, but is of a testaceous yellow colour, having only rudimentary wings, and is not furnished with the usual compound eyes, but has in their place exceedingly minute simple eyes or ocelli, besides three true ocelli on the vertex of the head: this remarkable conformation was discovered by Mr. Newport, who has given ample details, and the results of most elaborate physiological investigations, in the paper alluded to. *Melittobia* is here treated as the parasite of *Anthophora*, in accordance with the history of its habits as detailed by Mr. Newport; but when I discovered the larva, it was feeding on that of *Monodontomerus nitidus*, a true parasite

* See Kirby, Mon. Ap. Angl. ii. p. 290.

on the bee, which has been found in its cells feeding on the pupæ. Having obtained a large supply of larvæ of the bee, and also of *Monodontomerus* and *Melittobia*, ample means of observation were afforded, the result of which appeared to show that *Monodontomerus* is the true parasite of *Anthophora*, and *Melittobia* a parasite of both genera. *Melittobia* attacks indiscriminately the larvæ of both insects, but in their natural situation I only found them feeding on *Monodontomerus*. Several cells were obtained containing larvæ of *Melittobia*, but their victim was consumed; therefore it was not possible to determine satisfactorily whether they had fed upon the *Chalcis* or the bee. M. Audouin discovered *Melittobia Acasta* in the nests of *Osmia*, *Anthophora* and *Odynerus*; probably there are several species closely allied; for with insects so minute, and belonging to a family in which a very general resemblance obtains, it requires a practised eye, as well as a careful microscopic investigation, before the specific differences can be detected. The mode of attack which these parasites practise appears to be made by several females obtaining entrance to the cell of the bee and attacking its larvæ, upon which they deposit their eggs, to the number of one hundred at least, which soon hatch, and the young larvæ attach themselves to their victim, continuing to feed until full-grown, when they fall off and lie inactive at the bottom of the cell; by the time the whole brood is full-fed, the larva of the bee is entirely consumed. The bees and the parasites appear in their perfect condition about the same time in the season, some having passed the winter months in the larva state, others in their perfect condition.

Two bees are parasites upon the genus *Anthophora*—*Melecta luctuosa* and *M. armata*,—the former upon *A. retusa*, and the latter upon *A. acervorum*: the latter makes its appearance very early in the spring, as soon, in fact, as the first wild-flowers bloom; it may be sometimes observed early in March, attracted by the garden Crocus; it continues to be found as late as July, and was captured in the Isle of Wight on the 15th of that month. The latter circumstance is explained by an investigation of a large colony in the month of November, when a large portion of the brood will be found to have arrived at its perfect condition, the rest being still in the larva or the pupa state, the latter fast advancing to maturity; the entire brood of the colony will pass the ensuing winter either as larvæ or perfect insects; none can withstand its rigour in the intermediate or pupa state. Those which remain larvæ until the return of spring advance to the perfect state very irregularly; many will not become perfect until May, and a few probably not until June; this will account for the species being found during so many

months in one season. I have frequently had larvæ in an artificial position, that is, in glass tubes, or boxes, which have not changed until the second season, but am quite unable to account for such an apparent anomaly; how little, in fact, is at present known of the *complete history of the Aculeate Hymenoptera!* for, to use the words of Kirby, "So much knowledge, even with respect to a single genus, where the species are numerous, is not to be expected from one man." But if each hymenopterist would give faithful records of his observations, the day will come when, by a combination of observations, an approach will be made towards a perfect knowledge of the history, economy, and uses of each individual species.

1. Anthophora retusa.

A. hirsuta, atra; tibiarum posticarum scopa fulvo-aurea. *Mas*, corpore pilis fulvis dense vestito; ano nigricante.

Apis retusa, *Linn. Faun. Suec.* p. 420. 1689; *Syst. Nat.* i. 954. 8, & *Cab. Mus. Linn. Soc.* ♀.
Apis Haworthana, *Kirby, Mon. Ap. Angl.* ii. 307. 70 ♂.
Anthophora Haworthana, *Curtis, Brit. Ent.* viii. t. 357 ♂.
Smith, Zool. iii. 895. 2 ♂ ♀.
Anthophora retusa, *St. Farg. Hym.* ii. 69. 38.
Megilla retusa, *Nyland. Revis. Ap. Boreal.* p. 265. 2.

Female. Length 7 lines.—Black; the head nearly as wide as the thorax, the sides of the face and the labrum have a brown pubescence. Thorax: the disk clothed with short black pubescence, the sides of the metathorax with sooty-black, the posterior tibiæ and the basal joint of the tarsi clothed with fulvo-ferruginous pubescence; all the tarsi beneath ferruginous; the calcaria pale testaceous, the claws ferruginous. Abdomen slightly pubescent, the margins of the segments having a fringe of short sooty-black hair. B.M.

Male. Length 6-7 lines.—Black; the scape in front, the clypeus, the face on each side, and the labrum yellow; the clypeus with two large black maculæ at its base, sometimes uniting; and the labrum with two small black dots at the base; the pubescence on the vertex and on the disk of the thorax fulvous; in the centre of the latter is a mixture of black hairs; the anterior legs thinly fringed behind with fulvous hairs, the intermediate and posterior tibiæ fringed with fulvous; the basal joint of the intermediate tarsi has a thick short fringe in front, and a longer one behind of black pubescence; the basal joint of the tarsi black, the apical joints fulvous; the wings subhyaline,

faintly clouded at their apical margins. Abdomen: the basal segment, and sometimes the second also, thinly clothed with pale fulvous pubescence, the apical segments have a short black pubescence, the margins of the segments more or less fringed with pale hairs. B.M.

Having changed the specific name of this species, it is necessary to give reasons for so doing. In the first place, the authentic specimen in the Linnæan Cabinet is undoubtedly the present species; I have also ascertained that the next species, formerly considered the *retusa* of Linnæus, is not found in Sweden, whereas the present insect is common. The two species may at once be separated by simply examining the calcaria which arm the tibiæ; in *A. retusa* they are pale testaceous, in *A. acervorum* they are black. Mr. Kirby was not acquainted with the female of *A. retusa*, at least he considered the Linnæan typical specimen to be identical with *A. acervorum*; but on turning to the remarks on the Linnæan type in the 'Monographia,' we at once see the difference between it and the next species; Mr. Kirby says, "it is smaller, not quite so hairy, nor is its hair of so deep a black:" all characteristics of *A. retusa*, and not of *A. acervorum*.

The present species is somewhat local, but abundant in many situations; it is found at Hampstead Heath, Blackheath, Charlton, Coomb Wood, and is very plentiful at and near Shirley in Surrey. It is rather later in its appearance than *A. acervorum*, and is seldom met with much before the beginning of May.

2. Anthophora acervorum.

A. atra, hirsuta; tibiarum posticarum scopa fulvo-aurea. *Mas*, corpore atro, hirsuto-fulvo; ano nigricanti, pedibus intermediis elongatis, crinito-pectinatis.

Apis acervorum, *Fabr. Syst. Ent.* p. 382. 21 ♀; *Ent. Syst.* ii. 322. 36 (nec *Linn.*).
Apis Hispanica, *Panz. Faun. Germ.* 55. 6 (nec *Fabr.*).
Apis retusa, *Kirby, Mon. Ap. Angl.* ii. 296. 69 ♂ ♀.
Megilla acervorum, *Fabr. Syst. Piez.* p. 328. 2.
Nyland. Revis. Ap. Boreal. p. 266. 2.
Anthophora retusa, *Blanch. Hist. Nat. des Ins.* 406. 4. t. 7. f. 2.
Smith, Zool. iii. 894. 1.

Female. Length 7–8 lines.—Black; the pubescence black, the posterior tibiæ and the basal joint of the tarsi clothed with fulvo-ferruginous pubescence; the calcaria black. B.M.

Male. Length 7–8 lines.—Black; the scape in front, the clypeus, and face on each side, a transverse line above the clypeus, the labrum, and a spot at the base of the mandibles, yellow; a black spot on each side at the base of the labrum and clypeus; the vertex, thorax above, and two basal segments of the abdomen clothed with fulvous pubescence, that on the thorax beneath cinereous; the intermediate legs elongate, the basal joint of their tarsi having a short thick black fringe at the apex in front, and having, as well as the three following joints, a thin fringe of long black hair behind, the apical joint fringed with long black hair on both sides; the posterior tibiæ have a white fringe on their hinder margin; the apical segments of the abdomen clothed with black pubescence; the calcaria black.

B.M.

This species is found in all parts of the United Kingdom; in some situations it literally swarms. There is a colony of this bee in the chalk-pits at Northfleet, of such amazing extent, that in the middle of April a dark flickering shadow is cast on the ground from the countless numbers assembled. There can be little doubt of the present species being the wild bee, alluded to by Gilbert White in his 'History of Selborne,' which made its nests in the chalky soil, amidst the trenches of the Danish Camp, on Mount Carburn near Lewes. White describes the bee as dashing round the heads of intruders, with a sharp and hostile sound,—the very habit of *Anthophora acervorum*.

3. Anthophora quadrimaculata.

A. atra, pallido-villosa; thorace flavescenti; abdominis segmentis pallido marginatis. *Mas*, femoribus intermediis magnis, clavatis.

Apis 4-maculata, *Panz. Faun. Germ.* 55. 7.
Apis vulpina, *Kirby, Mon. Ap. Angl.* ii. 290. 65 ♂.
Apis subglobosa, *Kirby, Mon. Ap. Angl.* ii. 295. 68 ♀.
Megilla 4-maculata, *Fabr. Syst. Piez.* p. 331. 14.
Nyland. Ap. Boreal. p. 244. 3.
Anthophora quadrimaculata, *St. Farg. Hym.* ii. 84. 51.
Saropoda vulpina, *Curtis, Brit. Ent.* viii. 361.
Smith, Zool. iii. 892 ♂ ♀.

Female. Length 4½ lines. — Black; the pubescence on the face fuscous, on each side anteriorly is a little short cinereous pubescence, that on the vertex is black; on the disk of the thorax it is fulvo-ochraceous, the tips of the hairs black; on the metathorax the pubescence is pale fulvo-ochraceous, that

on the thorax beneath is cinereous; the legs have a short cinereous pubescence, that on the posterior tibiæ and intermediate and posterior tarsi above is white; the tarsi beneath fulvous, the calcaria testaceous, the claws ferruginous; the wings hyaline, very faintly clouded at their apical margins. Abdomen subglobose, the margins of the segments fringed with fulvo-ochraceous pubescence; between the fasciæ the pubescence is fuscous, that at the apex black. B.M.

Male. Length 4 lines.—Black; the scape in front, the clypeus, a transverse line above, the face on each side, the labrum, and a spot at the base of the mandibles, yellow; the clypeus has on each side at its base an angular black spot, and the labrum a minute round dot; in other respects it closely resembles the female; the femora clavate, the intermediate pair most thickly so. B.M.

In Mr. Kirby's own interleaved copy of the 'Monographia' was found a query as to whether this species was not the 4-*maculata* of Fabricius; all doubt however has been removed by Dr. Nylander, who saw that species in the Museum at Kiel. Mr. Kirby had also made a note to the effect that his *subglobosa* might be the female: this is in accordance with my own observation in the 'Zoologist.' *A. quadrimaculata* is a local insect, but it is met with in the vicinity of London; in the Battersea and Kentish Town Fields, it occurs plentifully during the month of July; it commonly frequents the Red Deadnettle (*Lamium purpureum*), and flies with great rapidity, in many respects resembling *Saropoda bimaculata*, particularly in its shrill piping hum. This bee burrows in banks.

4. Anthophora furcata.

A. corpore nigro, griseo-pubescenti; facie antice, labio, anoque, villoso-ferrugineis. *Mas,* corpore atro, cinereo-pubescenti; facie antice, labioque, flavis; abdomine apice furcato.

Apis furcata, *Panz. Faun. Germ.* 56. 8 ♂.
Kirby, Mon. Ap. Angl. ii. 288. 64 ♂ ♀. t. 17. f. 5 ♀, 6 ♂.
Anthophora furcata, *St. Farg. Hym.* ii. 82. 49.
Saropoda furcata, *Curtis, Brit. Ent.* viii. 361.
Smith, Zool. iii. 893. 3.
Megilla furcata, *Nyland. Ap. Boreal.* p. 245. 4.

Female. Length 6 lines.—Black; the pubescence on the labrum obscure ferruginous, that on the face fuscous, intermixed with

black on the vertex; the thorax has a fuscous pubescence on the disk, on the metathorax and sides it is pale fulvo-ochraceous; the legs have a similar pubescence, that on the posterior tibiæ and basal joint of the tarsi is of a brighter yellow; wings subhyaline. Abdomen ovate, the base has a thin pale pubescence, which is also thinly scattered over the whole abdomen, that at the apex being bright ferruginous. B.M.

Male. Length 5–5½ lines.—This sex closely resembles the female, but it has the clypeus and the face on each side, a transverse line above the clypeus, the labrum, and usually a spot on the scape in front, yellow; the clypeus has a round fuscous spot on each side at the base; the pubescence on the thorax is similar to that of the other sex above; beneath it is cinereous. Abdomen thinly clothed with pale pubescence, towards the apex it is black. B.M.

This bee is by no means abundant, nor is it generally distributed; it is however found in the vicinity of London during the months of July and August; it occurs in the Battersea and Kentish Town fields, frequenting the flowers of the Red Dead-nettle, frequently in company with *A. 4-maculata*; it is not uncommon in the neighbourhood of Brentford and Hammersmith, but has seldom been met with beyond the London district.

Subfamily 5. SOCIALES, *Latr.*

Genus 16. BOMBUS.

Apis, pt., *Linn. Syst. Nat.* p. 953 (1766).
Bombus, pt, *Latr. Hist. Nat. Ins.* xiv. 63 (1802).
Bremus, *Panz. Jurine, Hym.* p. 259.

Body oblong and densely pubescent; head subtriangular; antennæ geniculated, filiform, longer than the head. Ocelli placed in a slight curve in a transverse impression on the vertex. Labrum transverse, its anterior margin ciliated. Mandibles stout, grooved exteriorly towards their apex, which is rounded. Labial palpi four-jointed; the first joint elongate, longer than the mentum, the second joint about one-fourth as long as the first, ciliated at the sides; the third and fourth joints minute, placed outside and near the apex of the second joint. Paraglossæ short, broad, and rounded at their apex; labium linear, very

pubescent, and about one-third longer than the labial palpi. Maxillary palpi two-jointed. The superior wings with one marginal and three submarginal cells, the second submarginal cell much narrowed towards the marginal, receiving the first recurrent nervure about the middle; the third submarginal narrowed towards the marginal, receiving the second recurrent nervure near its apex. The posterior legs in the females have on the upper and under margins of the tibiæ externally, a dense fringe of stiff hairs, forming a corbicula or pollen-basket; the exterior surface of the tibiæ smooth, shining, and broadly dilated; the basal joint of the tarsi elongate, broad, flattened, and slightly concave exteriorly, deeply notched at the base, forming a stout tooth; the exterior margins ciliated with short stiff hairs; the claws bifid.

In the males the tongue is more elongate and slender; the mandibles have a dense fringe of curled hair on their inferior margins; the antennæ are more slender, and longer; the posterior tibiæ are not furnished with a corbicula, and are slightly thickened; the basal joint of the posterior tarsi not notched at the base; the abdomen has an additional segment, and the antennæ an additional joint.

The genus *Bombus* consists of a large number of species; it is widely distributed, having an extensive geographical range; twelve species are known to inhabit Java, India, and China; they are, however, apparently most abundant in northern latitudes. America produces several very beautiful species: from the arctic regions of that continent have been received species not distinguishable from those of Northern Europe. Several fine species are inhabitants of South America, but the genus has not yet been observed in Australia or New Zealand. The *Bombi* are the most generally known of all the genera of wild bees, hence they have received a variety of popular names: in Hampshire they are called Dumbledors, in other districts Bumble-bees and Hummel-bees; the brown species are known in Scotland as the Foggie-bee, no idea existing of there being more than one species of that colour. It is very probable that Humble may be a corruption of humming, for we constantly find, in Natural History, popular names given to animals and plants extremely characteristic. No one, who loves to watch Nature in all her varied guise, can have failed in early spring, when the catkins are first found on the willow, to notice the loud hum of the

females of different species of *Bombi*; and in May, when the horse-chestnut blooms, from the break to the close of day the hum of these industrious bees is unceasing.

Great difficulty has hitherto attended the discrimination of the species; no examination of specimens, or comparisons, could ever produce a correct division of these insects; in the pages open to all, in the woods, in the fields, and on the hills alone, could this be attained. During my entomological rambles for twenty years, no opportunity has been lost of acquiring a correct knowledge of these bees; and by an examination of an immense number of nests, and collecting the varieties into which the sexes run in many species, I hope to clear away many difficulties. The greatest tendency to vary in colouring will be found to obtain in the males, and no other method of correctly bringing together the extraordinary varieties which occur in this sex in some species has been discovered, than an examination of the organs of generation; in all the species they differ in form, but are constant in each individual species. The numerous varieties in the male sex of *Bombus muscorum* can be correctly and easily ascertained by the method which I have suggested; whilst in those species in which the other sexes differ in their colouring, the correctness of the descriptions may be relied upon: nearly all have been made from individuals either captured in or bred from the nests.

The economy of the *Bombi* has been very fully detailed by numerous authors. M. P. Huber has paid great attention to the economy of these bees, and his observations on their habits are generally in accordance with my own. I never found any females hybernating in the old nests; at the end of autumn these are always entirely deserted. During the winter months torpid females may be found hybernating, always singly, in decayed trunks of tree, under turf stacks, or in other sheltered and dry situations. The females of these bees, having passed the winter in a torpid state, are roused from their slumber by the warmth of returning spring, and each becomes the foundress of a separate colony. The nests formed in the first instance are of small dimensions, just sufficient to contain a few cells, in which to rear workers to assist her in the extensive works necessary to the wants of a large colony. When the larvæ of the bees are full-grown they spin a tough oval cocoon of silk, in which they assume the nymph state, and when sufficiently advanced towards maturity to require food, they commence gnawing off the top of the cocoon, in which they are greatly assisted by the workers. On first emerging from their confinement they are by no means matured, the pubescence with which they are covered is almost of one uniform pale colour, and it requires several days before

they acquire the gay livery in which we are in the habit of seeing them when on the wing.

The females and males do not appear before the season is considerably advanced, differing in the precise time in the various species: the males of *B. pratorum* appear first—these begin to come forth about the third week in May. The connexion of the sexes of these bees being very rarely observed, I am inclined to believe that it usually takes place in the nest; pairs of several species have however been captured under these circumstances; thus, independent of rearing them from their nests, giving additional evidence of their being correctly united.

The males after once leaving the nest seldom return to it, but I have several times observed them re-entering it, and by this means have discovered their colonies: and Mr. Kirby states that he once saw the male of *B. lapidarius* entering the nidus of that species.

The nests of the *Bombi* are infested with several insects which devour the wax and honey, and by others which devour the young brood; most nests swarm with a species of *Acarus*, which devours the wax and honey; the larvæ of *Tinea pellionella* also abound in many nests, they were found in great numbers in that of *B. Derhamellus*; in the same nest was also found *Antherophagus glaber* and *Anobium paniceum*: some communities are much infested with the larvæ of *Volucella*.

The *Bombi* have also a parasitic genus of bees which inhabit their nests, apparently occupying a state of aristocratic independence in the community; whether they take any part in the economy of the community has not been ascertained. These bees were first observed by Mr. Kirby; he noticed that four of the *Bombinatrices* had no corbicula for conveying pollen to their nests, and proposed a division for these Humble-bees, whose economy he conjectured must be different from that of the rest of the family. Although the parasitic connexion existing between these and the true *Bombi* has been long conjectured, no author has hitherto found them in the nests of the working species; although I have taken or examined a very large number of the nests of *Bombus*, I have only occasionally met with the parasites in them; but never in the nests of the brown Humble-bees. *Apathus Barbutellus* was found in the nest of *Bombus pratorum* and *Bombus Derhamellus*, but many nests do not contain parasites. *Apathus nemorum* occurs in the nest of *Bombus terrestris*, and it probably also frequents that of *B. subterraneus*. What office these bees perform in the economy of the nest has not been discovered; they live on the most friendly terms with the industrious part of the community, and it is probable that upon them devolves some important office, the nature of which it

would be very interesting to discover. It has been supposed, from the very close resemblance of the *Apathi* to the *Bombi*, that the former are an idle race reared at the expense of the industrious bees, and wearing a livery in imitation of them, for the purpose of deception; but there can be little doubt of these aristocrats of the community performing important and necessary duties highly conducive to the general prosperity of the whole. That the close resemblance of these bees is not for the purpose of deception is at once proved by the fact of *A. Barbutellus*, a yellow-banded bee, being found in the nest of *B. Derhamellus*, a black species having the tip of the body red; and we have already seen that, amongst the solitary bees, the greatest difference in appearance exists; we would instance *Epeolus* and *Colletes*, *Andrena* and *Nomada*, also *Melecta* and *Anthophora*.

A. Barbutellus has been found in the nest of *B. Scrimshiranus* in Scotland.

The numbers of which the societies of Humble-bees consist, vary greatly in different species; as a general rule, those which build a nest above ground are the smallest; the number found in a nest of *senilis* being 22 females, 44 workers, and 16 males, the remainder of the latter sex having left the nest; of undeveloped workers the combs contained 27 pupæ and 9 of males—this gives 118: of empty cells, which I believe had been occupied by males, there were 10, making a total of 128. This is the largest number which has been observed in any nest of this species, the time of taking the nest being the end of August; about half that number usually constitutes the entire population. A nest of *B. fragrans* contained only 5 females and about 20 workers: this being in the month of August, it would appear that the communities of this species are very small. The nests of *Bombus terrestris* contain the largest number of individuals; a nest taken in August contained 35 females, 20 males, and 160 workers; at this time the majority of males and females had left the nest: in this community were found 2 females and 9 males of *Apathus nemorum*.

Another circumstance connected with these bees is the various degrees of pugnacity which they exhibit when their dominions are invaded: the moss-builders exhibit little or no courage in defence of their citadel, they may be taken with impunity: but a far different race are those which build underground; these are bold and daring insects, which defend their nests with great courage.

The term Moss-builders must not be taken literally, since many nests are composed entirely of grass and leaves; but in situations where moss is plentiful, the nests will be found to be constructed entirely of that material. To show that Humble-

bees avail themselves of such materials as are most readily found, and suitable to their purpose, I may instance a very remarkable nest found near a farm-house. One of the brown species of Humble-bees was observed frequently flying into a stable through the latticed window; the bee was busily engaged in collecting bundles of short horse-hair accumulated from the currying of horses; this she flew off with to a short distance, and settled down with it amongst some grass; on examining the spot, a nest composed entirely of horse-hair was discovered: this interesting nest was destroyed before the bee had quite completed its construction. Another very interesting deviation from the usual economy of the moss-building bees was observed by Dr. William Bell: during the summer of 1854, a robin built its nest in the porch of his cottage at Putney; some time after this had been observed, a Humble-bee took possession of the nest, and adapted it to her own purpose: he was unfortunately unable to identify the species by capturing a specimen, the nest having been destroyed; but Dr. Bell saw the bee on one occasion, and observed that it was black with yellow bands, probably *Bombus pratorum*.

1. Bombus muscorum.

B. hirsuto-flavescens; thorace fulvo; abdomine plus minusve atro-fasciato.

Apis muscorum, *Linn. Faun. Suec.* p. 425. 1714; *Syst. Nat.* i. 960. 46, & *type in Cab. Mus. Linn. Soc.* ♀.
Apis agrorum, *Fabr. Ent. Syst.* ii. 321. 29?
Kirby, Mon. Ap. Angl. ii. 326. 81 ♀.
Apis floralis, *Kirby, Mon. Ap. Angl.* ii. 321. 76 ♀. t. 17. f. 14 ♂.
Apis Beckwithella, *Kirby, Mon. Ap. Angl.* ii. 323. 78 ♀.
Apis Sowerbiana, *Kirby, Mon. Ap. Angl.* ii. 322. 77 ♂.
Apis Curtisella, *Kirby, Mon. Ap. Angl.* ii. 324. 79 ♂.
Apis Francillonella, *Kirby, Mon. Ap. Angl.* ii. 319. 75 (worker), t. 17. f. 13.
Apis Fosterella, *Kirby, Mon. Ap. Angl.* ii. 325. 80 (worker).
Bremus agrorum, *Panz. Faun. Germ.* 85. 20 ♀.
Bombus agrorum, *Fabr. Syst. Piez.* p. 348. 30 ♀ (var.).
Dahlb. Bomb. Scand. 48. 28.
Drews. & Schiödte, Bomb. Denm. Kröy. Tidsskr. ii. 108. 2.
Nyland. Ap. Boreal. p. 228. 4.
Bombus muscorum, *Smith, Zool.* ii. 545. 2 ♂ ♀ ♂.
Bombus senilis, *Fabr. Syst. Piez.* p. 352. 50 (worker) (*Mus. Acad. Hafniæ*).

Female. Length 6-8 lines.—Black; the face clothed with obscure yellow pubescence; the clypeus naked and shining, the

pubescence on each side of it, and also that on the vertex, black. Thorax clothed above with rufo-fulvous pubescence, on the sides it is pale yellow, and beneath cinereous, as well as that on the femora, the legs otherwise have a black pubescence, the corbicula sometimes having a mixture of pale hairs; the basal joint of the tarsi ferruginous beneath. B.M.

Var. *α*. The abdomen having the first segment and the base of the second clothed with yellow pubescence, the remainder of the second segment and more or less of the third covered with black, thence to the apex clothed with rufo-fulvous pubescence; the corbicula black. (*A. Beckwithella*, Kirby.)

Var. *β*. The abdomen clothed with black pubescence, except at the base and apex, where it is rufo-ferruginous. (*A. agrorum*, Kirby.)

Worker. Length 3½–6½ lines.—Closely resembling the female; the face has a mixture of black and pale pubescence, that on the vertex black; the thorax has a rufo-fulvous pubescence above, on the sides it is pallid, and beneath white; the abdomen has a pale ochraceous pubescence, usually brightest at the apex, the third segment having sometimes a black band; in some instances there will be two or three obscure dark bands. B.M.

Var. *α*. The base and apex alone having pale fulvous pubescence, the intermediate portion clothed with black.

Male. Length 5–6 lines.—The pubescence on the head pale yellow, mixed with black on the vertex; the antennæ as long as the thorax, the joints subarcuate; the thorax has a fulvous pubescence above; the abdomen has a pale pubescence, and three or four obscure dark bands. B.M.

Var. *α*. The abdomen black. (*A. Curtisella*, Kirby.)

Var. *β*. The base of the abdomen black, the apex fulvous. (*A. agrorum* ♂, Kirby.)

Having included seven of the species of our great monographer in that of *B. muscorum*, I must observe that it has not been done without having repeatedly examined the communities of a large number of nests; in some, all the varieties described were found; in different nests, one or other of the varieties will usually be the most numerous; in nests found in the north of England, the variety *B. agrorum* is much more numerous than in the west. This species is found in all parts of the United Kingdom, and is undoubtedly the true *A. muscorum* of Linnæus: the typical specimen preserved in the cabinet at the Linnæan Society is a female.

That the varieties of the male constitute but one species, may

be proved by an examination of the inhabitants of nests in the autumn, when all the sexes can be found in them, and also by an inspection of the generative organs of the varieties.

2. Bombus senilis.

B. hirsuto-flavescens; thorace ferrugineo-fulvo.

Apis senilis, *Fabr. Syst. Ent.* p. 382. 26; *Ent. Syst.* ii. 324. 44; *Syst. Piez.* ? ♂, *Cab. Dom. Banks. Linn. Soc.*
Apis muscorum, *Fabr. Syst. Ent.* p. 381. 17.
Schrank, Ins. Aust. no. 801.
Rossi, Faun. Etrus. ii. 100. 904.
Christ. Hym. 130. t. 8. f. 3 & t. 11. f. 8.
Kirby, Mon. Ap. Angl. ii. 317. 74, & *Cab. Ent. Soc.*
Don. Eng. Ins. xi. 70. t. 382. f. 2.
Latr. Hist. Nat. xiv. 65. 7.
Dahlb. Bomb. Scand. 47. 27.
Westw. Nat. Libr. xxxviii. 253. t. 16. f. 3.
Drews. & Schiödte, Kröy. Tidsskr. ii. 107. 1.
Bombus senilis, *Fabr. Syst. Piez.* p. 352. 50?
Smith, Zool. ii. 544. 1.
Bremus muscorum, *Jurine, Hym.* 261.
Bombus cognatus, *Steph. Brit. Ent. Supp.* vii. 17. t. 43. f. 3 ♀.
Reaum. Hist. Ins. vi. 36. t. 2. f. 1, 2, 3.

Female. Length 8–9 lines.—Head, the pubescence entirely fulvous; the pubescence on the thorax above is of a rich rufo-fulvous, on the sides and beneath it is very pale, nearly white; the tegulæ rufo-piceous; wings subhyaline, their apical margins fuscous, the nervures rufo-fuscous; the legs have a pale yellow pubescence, the corbicula of the same colour; the basal joint of the tarsi ferruginous within. Abdomen clothed with pale fulvous-yellow pubescence; the pubescence is sometimes of a lemon colour, and at other times inclining to orange. B.M.

Worker. Length 6½ lines. — Coloured exactly like the female. B.M.

Var. *α.* Length 5 lines.—Resembling the former very closely, but having a mixture of black hairs on the vertex and on the sides of the disk of the thorax.

Var. *β.* Length 4 lines. — The colouring more obscure, the black hairs more predominant, intermixing with the pubescence on the legs.

Male. Length 6–7 lines.—The pubescence like that of the large-sized worker; the mandibles fringed with stiff curled fuscous hairs; the antennæ as long as the thorax, the joints subarcuate;

the abdomen rather more elongate than in the worker, the extreme apex having a mixture of fuscous pubescence. B.M.

The female of this species is easily distinguished from *B. muscorum*; its general colouring is different; its thorax has a much more rich fulvous pubescence; that on the abdomen is paler, and not subject to vary in colouring; the pale corbicula is also a good characteristic difference. The workers usually very closely resemble the female, but in var. *β*. is pointed out a very close approach to the worker of *B. muscorum*; this variety is not uncommon at Southend, but it appears to be local. Females received from Perthshire are exceedingly bright in colouring.

3. Bombus Smithianus.

B. hirsuto-ater; thorace supra fulvo; abdomine supra flavescenti, basi anguste nigro.

Bombus arcticus, *Dahlb. Bomb. Scand.* p. 50. 32. f. 20 ♀? (nec *Kirby, Parry's 1st Voy.*).
Zett. Ins. Lapp. p. 476. 13.
Nyland. Ap. Boreal. p. 228. 2.
Bombus Smithianus, *White, Proc. Linn. Soc.* 1851; *Ann. & Mag. Nat. Hist.* x. new ser. p. 294.

Female. Length 8–10 lines.—The head clothed with black pubescence, sometimes with a little pale pubescence on the margin of the vertex, and a few pale hairs at the insertion of the antennæ. Thorax clothed above with rufo-fulvous pubescence, that on the sides, beneath, and also that on the legs, black. Abdomen: the margin of the basal segment above, and the entire abdomen beneath, have a black pubescence; the pubescence on the second and third segments somewhat rufo-fulvous, that on the following segments paler yellow. B.M.

Var. *β*. The basal segment with pale pubescence at the sides, the basal margin alone having a few black hairs; the fringe of the corbicula above more or less obscure fulvous.

Worker. Length 4–7 lines.—This sex exactly resembles the female; the black hairs at the base of the abdomen are however usually obsolete. B.M.

Male. Length 6–7 lines.—This sex has more or less white pubescence on the clypeus, the beard on the mandibles fuscous, and the antennæ as long as the thorax; the posterior tibiæ have a pale fringe above. B.M.

This species was first discovered in this country by Mr. Adam White, who brought two specimens from Shetland: subsequently a nest was obtained, which was received at a time when all the sexes were found in it; it contained about ten males, a dozen females, and thirty workers. Not having seen the *B. arcticus* of Dahlbom, a doubt is added to the quotation.

The name given to this species by Dahlbom cannot be retained, Kirby having used it for a species of this genus brought from the Arctic regions by Captain Parry on his first voyage.

4. Bombus fragrans.

B. hirsutus, ater, supra flavus; thorace fascia atra.

Apis fragrans, *Pallas, It.* i. 474. 75 ♀.
Kirby, Mon. Ap. Angl. ii. 329. 83 ♂.
Apis pratorum, *Fabr. Ent. Syst.* ii. 322. 34.
Bombus pratorum, *Fabr. Syst. Piez.* p. 349. 36.
Bombus fragrans, *Illig. Mag.* v. 165. 10.
Dahlb. Bomb. Scand. p. 46. 26. f. 16.
St. Farg. Hym. i. 464. 9.
Drews. & Schiödte, Kröy. Tidsskr. ii. 171. 17.
Smith, Zool. ii. 545. 3.
Nyland. Ap. Boreal. p. 229. 6.

Female. Length 8–10 lines.—Head: the face has a pale fulvous pubescence, more or less obscure and intermixed with black hairs; the pubescence on the thorax above yellow, more or less inclining to fulvous, and having a band of black pubescence between the wings; the pubescence on the legs is also black. Abdomen clothed with bright yellow pubescence, having usually more or less of a fulvous tinge towards the base. B.M.

Worker. Length 5–7 lines.—Excepting in size, there is no difference between the workers and females. B.M.

Male. Length 6–7 lines.—Closely resembling the worker, but having the pubescence on the face and cheeks paler, the antennæ as long as the thorax, the abdomen narrower and more elongate. B.M.

This species is rare in the south and south-western counties, but appears to be plentiful in the north. In Yorkshire, particularly in hilly districts, it occurs plentifully; I have only once met with its nest, which exactly resembles that of *B. muscorum*, but its communities are much smaller.

5. Bombus sylvarum.

B. hirsuto-flavescens; thoracis fascia, abdominisque cingulis nigris, ano fulvo.

Apis sylvarum, *Linn. Faun. Suec.* p. 425. no. 1713; *Syst. Nat.* i. 960. 45 ♀, & *type in Cab. Linn. Soc.*
Scop. Ent. Carn. no. 822.
Fabr. Syst. Ent. p. 321. 27; *Ent. Syst.* ii. 321. 27.
Schrank, Ins. Austr. no. 807.
Rossi, Faun. Etrusc. ii. 906.
Kirby, Mon. Ap. Angl. ii. 326. 82. t. 17. f. 15 ♀, 16 ♂.
Bremus sylvarum, *Panz. Faun. Germ.* 85. 19?
Bombus sylvarum, *Fabr. Syst. Piez.* p. 348. 27.
Latr. Hist. Nat. xiv. 65. 8.
Illig. Mag. v. 164. 9.
Spin. Ins. Lig. fasc. i. 131. 6.
Dahlb. Bomb. Scand. 44. 24.
St. Farg. Hym. i. 463. 8.
Drews. & Schiödte, Kröy. Tidsskr. ii. 109. 4.
Smith, Zool. ii. 546. 4.
Nyland. Ap. Boreal. p. 236. 22.
Bombus veteranus, *Fabr. Syst. Piez.* p. 352. 52 (worker).
Huber's Observ. Linn. Trans. vi. 227. t. 25. f. 13–18.

Female. Length 8 lines.—The head has a short yellow pubescence, that on the vertex black. Thorax: the pubescence on the disk black; anteriorly, posteriorly, on the sides, beneath, and also on the legs, it is pale yellow; the tarsi beneath have a short ferruginous pubescence; the claws ferruginous. Abdomen: the basal segment clothed with pale yellow pubescence, most dense at the sides; on the second segment it is black, the posterior and lateral margins fringed with pale yellow; on the third it is black, the margins being fringed with pale yellow; on the three following segments it is fulvous, the margins being fringed with pale hairs. B.M.

Worker. Length 6–7 lines.—Differs very little, except in size, from the female; it has, however, usually a greater mixture of pale pubescence, and the apex of the abdomen is not so bright a red. B.M.

Male. Length 6 lines.—Closely resembles the other sexes; the mandibles fringed with fusco-ferruginous hairs, the antennæ as long as the thorax, and the apex of the abdomen usually as bright as in the female. B.M.

There is no species more constant in its colouring than this beautiful bee; its nest is to be found in similar situations to

that of *B. muscorum*, but it has been observed to prefer open spaces in woods. The hum of the worker is more shrill than that of any other species of the genus; it closely resembles that of *Saropoda bimaculata*. The species is found in all parts of the United Kingdom: examples have been received from various parts of Scotland and Ireland.

6. Bombus lapponicus.

B. hirsutus, ater; thorace flavescente, fascia nigra; abdomine rufo, ano flavescente.

Apis lapponica, *Fabr. Ent. Syst.* ii. 253. t. 1. f. 3.
Quenzel, Acerbi's Trav. in Lapl. ii. 253. t. 1. f. 3.
Bombus lapponicus, *Fabr. Syst. Piez.* p. 345. 11.
Ahrens, Faun. Eur. 10. 18.
Dahlb. Bomb. Scand. 41. 18.
Zett. Ins. Lapp. p. 474. 10.
St. Farg. Hym. i. 459. 1.
Nyland. Ap. Boreal. p. 235. 20.
Apis flavicollis, *Sowerby, Brit. Miscell.* i. 39. t. 19 ♀.
Bombus regelationis, *Newm. Ent. Mag.* ii. 327 (nec *Panz.*).
Bombus montanus, *Smith, Zool.* ii. 549. 13 (nec *St. Farg.*).
Bombus monticola, *Smith, Zool. Append.* p. 59.

Female. Length 7–9 lines. — The pubescence on the head, thorax, legs, and abdomen beneath, black; the thorax in front, and the scutellum more or less clothed with yellow pubescence. The basal segment of the abdomen above, and the second more or less at the base in the middle, black; the following segments clothed with bright fulvous, more or less yellow at the apex. B.M.

Var. β. The scutellum entirely black.

Worker. Length 4–6 lines.—Exactly resembles the female in colour, but the abdomen is usually less inclined to yellow. B.M.

Male. Length 5–6 lines.—Bears a very close resemblance to the other sexes, but has a yellow pubescence on the clypeus, some yellow hairs intermixed on the vertex, and the thorax beneath has also a mixture of yellow hairs; the antennæ scarcely as long as the thorax, the mandibles fringed with fuscous pubescence. B.M.

An examination of a series of all the sexes of this bee, and also of specimens from northern Europe, leaves no doubt of its being the *B. lapponicus* of the Continent. British examples are

usually smaller than continental ones, but that they are identical is certain. This is a very local species, but has been taken plentifully at the Black Mountain, Llantony Abbey, Brecknockshire, South Wales; it also occurs in Herefordshire and Monmouthshire, and has been captured on Halifax Moor, and on the hills in that district; it is also found in some abundance at Loch Rannoch in Perthshire. It frequents elevated situations, and is a very active insect, passing with great rapidity from flower to flower.

7. Bombus Derhamellus.

B. hirsutus, ater, corbicula anoque fulvis. *Mas*, fusco-cinerascens, ano fulvo, thorace inter alas abdominisque fascia atris.

Apis Derhamella, *Kirby*, *Mon. Ap. Angl.* ii. 363. 105 ♂, *and type in Cab. Ent. Soc.*
Apis Raiella, *Kirby*, *Mon. Ap. Angl.* ii. 367. 107 ♀, *and Cab. Ent. Soc.*
Bombus Raiellus, *Illig. Mag.* v. 169. 29.
Dahlb. Bomb. Scand. 33. 4.
Drews. & Schiödte, Kröy. Tidsskr. ii. 115. 9.
Smith, Zool. ii. 550. 15.
Nyland. Ap. Boreal. 238. 26.
Bombus Derhamellus, *Dahlb. Bomb. Scand.* 44. 23 ♂.
Bombylius minor, *Ray*, *Hist. Ins.* p. 246. 2.

Female. Length 6½–8 lines.—The body clothed with black pubescence, that on the three apical segments rufo-fulvous; the corbicula on the posterior tibiæ rufo-fulvous, the apical joints of the tarsi ferruginous. B.M.

Worker. Length 4½–6 lines.—Differs only in size, having the corbicula rufo-fulvous as in the female. B.M.

Male. Length 5–6 lines.—The pubescence on the head black, more or less fuscous on the clypeus, the mandibles fringed with ferruginous pubescence. Thorax clothed above with obscure fuscous-yellow pubescence, that between the wings black; the tibiæ and tarsi ciliated with rufous hairs; the tarsi ferruginous beneath, the claws ferruginous. Abdomen: the two basal segments clothed with obscure flavo-fuscous pubescence, that on the third segment black, and that on the remainder rufo-fulvous. B.M.

Var. β. The pubescence on the second segment of the abdomen bright yellow.

Var. γ. The thorax fringed with yellow pubescence, that on the two basal segments of the abdomen yellow.
Var. δ. The abdomen entirely covered with obscure flavo-fuscous pubescence.
Var. ε. The abdomen almost entirely fulvous.

The male is described of the colour most usually met with, but it is very variable, and interminable shades of variety occur.

The species occurs in all parts of the kingdom, but is certainly most abundant in the north, where its nests are very commonly met with in hay-fields and pastures; they have also been taken near London on banks, from which many varieties of the males have been obtained; but no varieties have been observed of the other sexes, nor have any of the *Apathi* been found in the nests. The colonies are not very numerous, nor is the species very pugnacious, their nests may be taken with little danger.

8. Bombus pratorum.

B. hirsutus, ater; thorace antice sulphureo-flavo; abdominis segmento secundo fascia subinterrupta flava. *Mas*, hirsuto-flavus; thorace postice nigro marginato; abdomine fascia atra, ano fulvo.

Apis pratorum, *Linn. Faun. Suec.* no. 1711; *Syst. Nat.* i. 960. 43 ☿, *and type in Cab. Linn. Soc.*
Schrank, Ins. Aust. no. 798.
Kirby, Mon. Ap. Angl. ii. 360. 103.
Apis collaris, *Scop. Ent. Carn.* no. 818?
Apis subinterrupta, *Kirby, Mon. Ap. Angl.* ii. 356. 99 ♀.
Apis Donovanella, *Kirby, Mon. Ap. Angl.* ii. 357. 100. t. 18 (f. 6 ♀ var.).
Apis Burrellana, *Kirby, Mon. Ap. Angl.* ii. 358. 101 ♂.
Bombus subinterruptus, *Latr. Hist. Nat.* xiv. 64. 4.
Illig. Mag. v. 167. 20.
Dahlb. Bomb. Scand. p. 35. 7.
St. Farg. Hym. i. 461. 5.
Drews. & Schiödte, Kröy. Tidsskr. ii. 111. 7.
Bombus Burrellanus, *Dahlb. Bomb. Scand.* p. 43. 22 ♂.
Bombus pratorum, *Illig. Mag.* v. 168. 27.
Dahlb. Bomb. Scand. p. 36. 9 ☿.
Drews. & Schiödte, Kröy. Tidsskr. ii. p. 111. 7.
Smith, Zool. ii. 548. 11 ♂ ♀ ☿.
Bombus ephippium, *Dahlb. Bomb. Scand.* p. 37. 10.
Zett. Ins. Lapp. p. 473. 6.
Bombus Donovanella, *Westw. Nat. Libr.* xxxviii. p. 255. t. 17. f. 1 ♂.
Bombus lullianus, *Nyland. Ap. Boreal.* p. 236. 21 ♂.

Female. Length 6–8 lines.—The pubescence on the head and thorax black, that on the latter in front of the wings, above, fulvous-yellow. Abdomen: the first and third segments clothed with black pubescence, the second with fulvous-yellow, and the apical segments with fulvous; the yellow band subinterrupted. B.M.

Var. β. The black band covering the third and fourth segments. (*A. subinterrupta*, Kirby.)

Var. γ. The yellow band entire.

Worker. Length 4–5 lines.—The pubescence black, that in front of the wings, on the thorax above, yellow. Abdomen: the second segment having a narrow yellow fascia at its basal margin; the two apical segments rufo-fulvous. B.M.

Var. β. The yellow pubescence on the second segment of the abdomen obsolete, and having only the extreme apex red.

Male. Length 5–6 lines.—The pubescence on the head yellow, intermixed on the sides of the face and on the vertex with fuscous hairs; the fringe on the mandibles rufo-fulvous. Thorax: the pubescence before the wings yellow, behind it is black, sometimes having a mixture of yellow hairs on the scutellum; the pubescence on the two basal segments of the abdomen yellow, on the third and fourth it is black, and on the rest it is fulvous. B.M.

Var. β. The black pubescence thickly intermixed with yellow, which in some lights gives the insect an entirely yellow appearance.

The different sexes and varieties of this bee have been described as forming no less than six distinct species; and indeed in this difficult genus, nothing but the examination of the bees found in numerous nests would convince any one of the possibility of some of the varieties not belonging to distinct species.

The female described is the *A. Donovanella* of Kirby, being the most highly-coloured form; var. γ. appears to be not at all uncommon in Wales, from whence I received it. Of the worker, var. β. is the *A. pratorum* of Linnæus. The male has been supposed to be identical with the *Apis Cullumana* of Kirby, but it is quite distinct. The male described as belonging to this species by Kirby is that of *Apathus rupestris*, and his var. β. is the female of *B. lucorum*.

This species is found in all parts of the kingdom; its nest frequently occurs on Hampstead Heath, under furze bushes, and also on banks. *Apathus Barbutellus* has been bred from its nest, but it does not always occur. Mr. Walcott and Mr. Grant have both found the same *Apathus* parasitic upon it.

9. Bombus nivalis.

B. hirsutus, ater; thorace antice, segmentisque duobus primis abdominis flavis; ano flavo vel fulvescenti.

Apis alpina, *Fabr.* (*Otho*) *Faun. Græn.* p. 199. 155 (nec *Linn.*).
Bombus nivalis, *Dahlb. Bomb. Scand.* p. 40. 16 ♀.
Zett. Ins. Lapp. p. 474. 7.
Nyland. Ap. Boreal. p. 234. 17.
Bombus balteatus, *Dahlb. Bomb. Scand.* p. 36. 8.
Bombus tricolor, *Dahlb. Bomb. Scand.* p. 40. 17.
Zett. Ins. Lapp. p. 474. 9.

Female. Length 8 lines.—The pubescence black; the thorax above before the insertion of the wings, the scutellum, and the two basal segments of the abdomen, yellow; the three apical segments of a fulvous-yellow. B.M.

Male. Length 6 lines.—This sex differs in having the pubescence longer than in the female; the face has a yellow pubescence, and the black band on the abdomen occupies the third and fourth segments; the body beneath entirely covered with long pale pubescence. B.M.

Professor Boheman says this species differs in having the apex of the abdomen sometimes fulvous and at other times yellow; Dr. Nylander also points out these varieties; the yellow bands are also sometimes less bright and distinct. These variations constitute three of Dr. Dahlbom's species, as shown above.

This fine addition to our fauna was made in 1852; it was discovered at Lerwick, in Shetland, and is the second species of *Bombus*, previously unknown as British, which has been received from the same locality. Were this group of islands well searched by some competent entomologist, there can be little doubt of still further additions being made,—in all probability *B. alpinus* amongst the number.

10. Bombus Scrimshiranus.

B. hirsutus, ater; facie brevi, triangulari; thorace antice, scutello abdominisque basi flavis, ano albo.

Apis Scrimshirana, *Kirby, Mon. Ap. Angl.* ii. 342. 92 ♀, *and type in Cab. Ent. Soc.*
Bombus Scrimshiranus, *Illig. Mag.* v. 166. 18.
Dahlb. Bomb. Scand. 39. 13.
Drews. & Schiödte, Kröy. Tidsskr. ii. 118. 12.

Bombus Scrimshiranus, *Smith, Zool.* ii. 547.
Nyland. Ap. Boreal. p. 232. 12.
Apis Jonella, *Kirby, Mon. Ap. Angl.* ii. 338. 90 ♂ ?

Female. Length 7–8 lines.—The pubescence black, that on the margin of the vertex, thorax anteriorly, scutellum, and basal segment of the abdomen, yellow; that on the three apical segments white; the scopa on the posterior tibiæ ferruginous; the apical joints of the tarsi rufo-piceous. B.M.

Worker. Length 5–6 lines.—Excepting size, there is no difference between this and the female. B.M.

Male. Length 5–6 lines.—The pubescence on the face yellow, the antennæ as long as the thorax; the pubescence on the thorax in front, that on the scutellum and basal segment of the abdomen, yellow, sometimes of a fulvous-yellow; the pubescence on the three following segments black, the apex white; the entire insect beneath has a white or pale yellow pubescence. B.M.

Var. β. The two basal segments yellow.

This very distinct species is rare in the vicinity of London; it was met with in 1827 at Coomb Wood, at that time a favourite resort of the entomologist; it was again taken in 1854 by Mr. Grant on Putney Heath; it appears to be tolerably abundant in Wales, and has been received from Loch Rannoch in Perthshire; Mr. Syme found it in Orkney. Dr. Nylander states that it is frequent in Finland; and M. Schiödte takes it in Denmark, from whence he supplied me with specimens.

11. Bombus collinus.

B. mas, hirsutus, ater; thorace antice flavo, abdomine basi flavo, medio nigro-fasciato, apice albo, pilis apicalibus basi rufo-fulvis.

Bombus collinus, *Smith, Zool.* ii. 548. 17 ♂; *Cat. Hym. Acul.* p. 104. 14.

Male. Length 5–6 lines.—The face clothed with black pubescence, that on the cheeks inclining more or less to yellow; the thorax before the insertion of the wings, the sides and breast beneath, clothed with yellow pubescence; the pubescence which fringes the femora more or less obscurely yellow; the thorax behind the collar black, the third segment of the abdomen also clothed with black pubescence, as well as the legs; the

apex of the abdomen white, separated from the black band by a narrow band of fulvous pubescence. B.M.

Var. β. The face having a mixture of obscure yellow pubescence.

Only a single example of this species was known for some years, it was taken at Westow in Yorkshire; it was thought it might prove a rare variety of *B. terrestris*, until Mr. Walcott captured several on the Downs near Bristol, and received others from the Brighton Downs; an examination of numerous individuals shows it to be a distinct species: the formation of the generative organs separates it from all our known British species. Mr. Heysham captured a fine series in Cumberland, and also examples of a worker bee which probably belongs to this species; it has the tip of the abdomen white, bordered with a faint band of fulvous hairs. Mr. Walcott once possessed a female, which he has by some accident lost: his recollection of it is, that it was the size of *B. Scrimshiranus*; the fourth segment of the abdomen had deeper-coloured fulvous hairs than in the male.

12. Bombus terrestris.

B. hirsutus, ater; thorace antice, abdominis fascia media, anoque, flavis.

Apis terrestris, *Linn. Faun. Suec.* p. 424. no. 1709 ♀, *and type sp. in Cab. Linn. Soc.*; *Syst. Nat.* i. 960. 41.
Don. Brit. Ins. iii. 41. t. 88. f. 1.
Kirby, Mon. Ap. Angl. (var. γ & ε ♀); *Specim. in Cab. Ent. Soc.*

Bombus terrestris, *Westw. Nat. Libr.* xxxviii. 243. t. 14.
Smith, Zool. ii. 547. 10, *and Cat. Brit. Acul. Hym* .103. 11 ♂ ♀ ☿.
Nyland. Revis. Ap. Boreal. p. 262. 7 (nec var.).
Reaum. Ins. vi. *Mem.* 1st. 2. t. 3. f. 1.

Female. Length 9–11 lines.—The pubescence black, the collar orange-yellow; the second segment of the abdomen has a band of the same colour, the fifth segment and apical margin of the fourth clothed with pale fulvous pubescence, the sixth naked. B.M.

Worker. Length 6–7 lines.—Closely resembles the female, but the yellow bands are frequently of a paler tint; the apical segments have white instead of tawny pubescence, but the

white is always mixed more or less with fulvous hairs at its junction with the black fascia. B.M.

Male. Length 7-8 lines.—The pubescence on the head entirely black, the collar and second segment of the abdomen clothed with pubescence of an orange-yellow, usually rather brighter than in the females; the apex of the abdomen clothed with pale tawny hairs, sometimes white at the extreme apex. B.M.

Relying on an examination of the typical specimen in the Linnæan Cabinet, which agrees with our insect, I conclude that authors hitherto have been misled by the description in the 'Fauna Suecica': "Abdomen antice nigrum, dein flavum, medio nigrum, postice album"—the latter being pale yellow in the typical specimen. Kirby appears to have considered the bee with the tawny apex to the abdomen distinct from that with the white one, which is the female of *B. lucorum*, but still with some doubt; and on being informed by Mr. Trimmer that he had found both in the same nest, he at once reduced it to a mere variety. Having repeatedly taken entire broods of nearly all our *Bombi*, I have learnt, that the fact of finding one or two specimens of a distinct species mixed with a brood, can only be regarded as accidental: thus, amongst the moss-building species it is not an uncommon occurrence to find workers of *B. muscorum* in nests of *B. sylvarum*. I have taken many nests of *B. terrestris*, but never found the female of *B. lucorum* in one; nevertheless it may occasionally occur. If any doubt could possibly exist of the female described being distinct from the bee with the white abdominal apex, the fact of my having obtained upwards of 50 females and 100 males, all agreeing with the above descriptions, from the same nest, and also having captured several pairs *in coitu*, must set the matter at rest: and it may also be observed, that all authors agree in describing *B. lucorum* ♂, but none have described its female.

This species is found in all parts of the United Kingdom; its colonies are more numerous than those of any other *Bombus* found in this country: in one nest were found 107 males, 56 females, and 180 workers. They burrow sometimes to a considerable depth, or probably avail themselves in many instances of some ready-formed entrance, as nests have been found nearly five feet from the entrance, in banks of light earth.

13. Bombus lucorum.

B. hirsutus, ater; thorace antice, abdominisque fascia flavis, ano

albo. *Mas*, supra flavus, thoracis fascia nigra; abdominis fasciis obsoletis nigris; ano albo.

Apis lucorum, *Linn. Faun. Suec.* p. 427. no. 1716 ♂, *and type in Cab. Linn. Soc.*; *Syst. Nat.* i. 961. 48.
Fabr. Ent. Syst. ii. 322. 35; *Syst. Piez.* p. 350. 37.
Schrank, Ins. Aust. p. 401. 808.
Kirby, Mon. Ap. Angl. ii. 336. 89.
Apis terrestris, *Christ. Hym.* p. 127. t. 7. f. 2 ♀.
Kirby, Mon. Ap. Angl. ii. 350 (nec var. γ & ε ♀).
Apis cæspitum, *Panz. Faun. Germ.* 31. 19 ♂.
Apis virginalis, *Kirby, Mon. Ap. Angl.* ii. 349. 95, *and type in Cab. Ent. Soc.* (worker).
Bombus terrestris, *Latr. Hist. Nat. Ins.* xiv. 64. 1 ♀.
Fabr. Syst. Piez. p. 343. 4.
Dahlb. Bomb. Scand. 34. 5. f. 5.
Zett. Ins. Lapp. p. 473. 4.
St. Farg. Hym. i. 467. 13.
Drews. & Schiödte, Kröy. Tidsskr. ii. 118. 12.
Nyland. Ap. Boreal. p. 232. 13.
Bombus lucorum, *Smith, Zool.* ii. 546. 6 ♂ ♀ ☿.

Female. Length 8–9 lines.—The pubescence black, the thorax anteriorly and the second segment of the abdomen clothed with yellow pubescence; the three apical segments snow-white. B.M.

Worker. Length 4–6 lines.—The colouring of the pubescence as in the female. B.M.

Male. Length 5½–8 lines.—The face, thorax in front, the scutellum, and two basal segments of the abdomen clothed with yellow pubescence, the three apical segments white; beneath, the pubescence is yellowish-white; the tibiæ are fringed with pale yellow hairs, the apical joints of the tarsi rufo-piceous. B.M.

Var. β. The black band between the wings nearly obsolete; the black band on the abdomen intermixed with yellow hairs, subobsolete.

The var. β. agrees with the typical specimen in the Linnæan Cabinet; the yellow in this species is lemon-coloured, which alone distinguishes it from *B. terrestris*. Specimens of the male from the north of Scotland are sometimes almost entirely yellow. All the sexes have been obtained from the nest by Mr. Walcott, who bred them and kindly furnished me with examples. The female makes her appearance earlier in the spring than *B. terrestris*, and is found in all parts of the United Kingdom.

14. Bombus soroensis.

B. hirsutus, ater; abdominis segmento secundo utrinque obsolete flavo, ano albo. *Mas,* pallidus; ano roseo-albo; thorace abdomineque singulis fascia atra.

Apis soroensis, *Fabr. Ent. Syst.* ii. 318. 12 ♀.
Panz. Faun. Germ. 7. 11.
Bombus soroensis, *Fabr. Syst. Piez.* p. 345. 10.
Dahlb. Bomb. Scand. p. 43. 22.
Drews. & Schiödte, Kröy. Tidsskr. ii. 112. 8. t. 2. f. *e* ♂, *f* ♀.
Nyland. Ap. Boreal. p. 239. 28.
Apis neutra, *Panz. Faun. Germ.* 83. 18; *Krit. Revis.* ii. 259 ☿.
Bombus neutra, *Fabr. Syst. Piez.* p. 347. 24.
St. Farg. Hym. i. 469. 15.
Apis Cullumana, *Kirby, Mon. Ap. Angl.* ii. 359. 102 ♂.
Bremus sylvarum, *Panz. Faun. Germ.* 85. 19.
Bombus Cullumanus, *Smith, Zool.* ii. 548. 11.
Bombus Burrellanus, *Dahlb. Bomb. Scand.* 43. 22 ? (nec *Kirby*).
St. Farg. Hym. i. p. 462. 6 ♂.
Drews. & Schiödte, Kröy. Tidsskr. ii. 112. 8. t. 2. f. 7 *e, f* (nec *Kirby*).
Nyland. Ap. Boreal. p. 240 (nec *Kirby*).

Female. Length 7–8 lines.—The pubescence black, the tip of the abdomen white; the white pubescence is separated from the black by a mixture of reddish-yellow hairs. B.M.

Var. β. The second segment of the abdomen has laterally a little yellow pubescence.

Var. γ. The thorax yellow in front, the second abdominal segment having laterally a tuft of yellow pubescence.

Var. δ. The thorax yellow in front; the abdomen black, apex of the abdomen yellowish-white.

Var. ε. The thorax anteriorly obsoletely yellow, the second abdominal segment obsoletely yellow laterally; the apex yellowish-white.

Worker. Length 5–7 lines.—The pubescence black, apex of the abdomen yellowish-white.

Var. β. The apex of the abdomen fulvous.

Var. γ. The thorax in front and the abdomen on each side at the base yellow; apex reddish-yellow.

Male. Length 5–6 lines.—The pubescence pale yellow; the vertex and cheeks have a black pubescence; a black fascia between the wings, and the third segment of the abdomen clothed with black pubescence, that on the four apical segments ferruginous; beneath, the pubescence is pale yellow. B.M.

Var. β. The yellow fascia on the abdomen subinterrupted.

Above are enumerated such varieties as appear absolutely necessary to mention, but it must be borne in mind that intermediate ones undoubtedly occur. The male of this species has been long known as the *A. Cullumana* of Kirby; but the insect was very rarely seen in collections. Mr. Walcott obtained several from the Brighton Downs, and also captured it in the vicinity of Bristol; but it was not until 1853 that I became aware of the fact that *B. Cullumanus* is the male of the true *B. soroensis* of Fabricius: this was communicated to me by M. Schiödte of Copenhagen. The bee which in this country had been supposed to be identical with the *B. soroensis* of Fabricius, is one of the varieties of *B. subterraneus*: the true species is much smaller than any example of *B. subterraneus*. During the month of August 1854, I met with *B. soroensis* for the first time at Southend, and obtained all the sexes in that locality: having diligently collected during the last twenty years, without meeting with this species, it is probable that it is extremely local, and that its communities are small. Dr. Nylander regarded the *A. Burrellana* of Kirby as the male of *B. soroensis*; and although it has a very similarly coloured pubescence, it is seen to be very different on comparison; its pubescence is much longer, and the different colours are less distinctly separated; it is also usually smaller, the yellow bands are of a deeper colour, and the insect is altogether less compact in appearance. The male when in fine condition is perhaps the most beautiful of all our *Bombi*; its short dense pubescence and distinctly contrasted colours at once divide it from the male of *B. pratorum*.

15. Bombus lapidarius.

B. hirsutus, ater, ano rufo-fulvo. *Mas*, facie, thorace antice et scutello flavis.

Apis lapidaria, *Linn. Faun. Suec.* p. 424. no. 1712; *Syst. Nat.* i. 960. 44, *and type in Cab. Linn. Soc.* ♀.
Vill. Ent. Eur. iii. no. 98.
Scop. Ent. Carn. p. 305. no. 813. f. 813. 1.
Fabr. Syst. Ent. p. 381. 14; *Ent. Syst.* ii. 329. 25; *Syst. Piez.* p. 347. 25.
Schrank, Ins. Austr. p. 396. no. 799.
Fourc. Ent. Par. ii. 449. 22.
Christ. Hym. p. 126. t. 7. f. 1 ♀.
Don. Eng. Ins. iii. 97. t. 108. f. 1 ♀. t. 58. f. 2 ☿.
Kirby, Mon. Ap. Angl. ii. 363 106 ♂ ♀ ☿.
Apicis pertristis, *Harris, Expos. Eng. Ins.* p. 137. t. 40. f. 14 ♂.
Apicis opis, *Harris, idem*, p. 137. t. 40. f. 12 ☿.

Apis coronata, *Fourc. Ent. Par.* ii. 449. 23 ♂.
Apis arbustorum, *Fabr. Ent. Syst.* ii. 320. 24 ♂; *Syst. Piez.* p. 347. 23.
Bremus truncorum, *Panz. Faun. Germ.* 85. 21 ♂.
Bremus regelationis, *Panz. Faun. Germ.* 86. 17 ♂?
Bombus lapidarius, *Latr. Hist. Nat. Ins.* xiv. 64. 2 ♀.
Fabr. Syst. Piez. p. 347. 25.
Spin. Ins. Lig. fasc. i. 130. 4.
Dahlb. Bomb. Scand. 30. 1.
St. Farg. Hym. i. 460. 3.
Brullé, Expéd. Sc. de Morée, p. 528. 729.
Drews. & Schiödte, Kröy. Tidsskr. ii. 116. 11.
Westw. Nat. Libr. xxxviii. 252. t. 16. f. 1 ♂, 2 ♀.
Smith, Zool. ii. 549. 14.
Nyland. Ap. Boreal. p. 238. 25.
Bombus Lefebvrei, *St. Farg. Hym.* i. 461. 4, *type sp. in Coll. Westw.* (var.)

Female. Length 10 lines.—Densely clothed with black pubescence, the three apical segments clothed with rufo-fulvous pubescence; the legs rufo-testaceous beneath, the tarsi clothed beneath with ferruginous pubescence, the apical joints rufo-testaceous; the wings subhyaline, faintly clouded at their apex. B.M.

Var. β. The collar having an indistinct yellow band.

Worker. Length 5–6½ lines.—There is no other difference except size between the worker and the female. B.M.

Male.—The pubescence black, that on the face, margin of the vertex and collar yellow; the scutellum and basal segment of the abdomen have a mixture of yellow hairs; the four apical segments bright rufo-fulvous; the femora fringed with long pale yellow hairs, the posterior tibiæ and the tarsi fringed with ferruginous hairs. B.M.

Var. β. The scutellum and basal segment of the abdomen entirely black.

Var. γ. The abdomen having merely a few red hairs on the apical margins of the three apical segments.

Var. δ. The apex in certain lights has only a faint tinge of red.

The variety of the female is extremely rare; only a single specimen has been captured, at Sandwich, Kent; it is the *B. Lefebvrei* of St. Fargeau; I have had an opportunity of examining the typical specimen through the kindness of Mr. Westwood, in whose possession are many of the type specimens of St. Fargeau's and Latreille's bees. The varieties γ. and δ. ♂ are also very rarely met with; three specimens occurred in August 1854

at Southend, where the insect abounds. The species is distributed over all parts of the United Kingdom, although it is scarce in some districts; specimens have been received from North and South Wales, and from Moffat and Perth in Scotland; those from the latter locality are remarkable for the vivid redness of the pubescence on the apical segments of the abdomen. Specimens have also occurred in various parts of Ireland.

Although this bee may prefer constructing its nest under stones, still it will be frequently found in banks and at the roots of trees.

16. Bombus hortorum.

B. hirsutus, ater; thorace antice, scutello, abdominisque basi, flavis; ano albo; capite elongato.

Apis hortorum, *Linn. Faun. Suec.* p. 424. no. 1710; *Syst. Nat.* i. 960. 42, *and type in Cab. Linn. Soc.* ♀.
Schrank, Ins. Aust. p. 395. 797.
Bombus hortorum, *Latr. Hist. Nat.* xiv. 65. 5 ♀.
Illig. Mag. v. 166. 17.
Walck. Ins. Par. ii. 146.
Dahlb. Bomb. Scand. 38. 12 ♂ ♀ ☿.
St. Farg. Hym. i. 466. 12.
Brullé, Expéd. Sc. de Morée, iii. 328. 731.
Drews. & Schiödte, Kröy. Tidsskr. ii. 120. 16.
Smith, Zool. ii. 546. 7.
Nyland. Ap. Boreal. p. 231. 11.
Huber, Obs. p. 226. t. 25. f. 10–12.

Female. Length 10 lines.—The pubescence black; the collar, scutellum and basal segment of the abdomen densely clothed with sulphur-yellow pubescence, that on the three apical segments white; the face elongate; the tongue nearly as long as the body. B.M.

Worker. Length 5–6½ lines.—The colour as in the female.

Male. Length 6–7 lines.—The distribution of colour as in the other sexes, the apical segment having black pubescence; the mandibles bearded with black hairs. B.M.

I have not observed any varieties in the sexes of this species; it is universally distributed, and is most abundant and easily distinguished. I formerly regarded the *B. ruderatus* of Fabricius as synonymous with this, but it is certainly distinct; it differs from *B. hortorum* in having the pubescence longer, the second segment being fringed, or sometimes entirely covered with

a mixture of reddish-yellow hairs; the tongue is proportionally shorter, and the insect altogether larger. Mr. Wollaston found it abundantly in Madeira.

17. Bombus Latreillellus.

B. hirsutus, ater; thorace antice, scutello, abdominisque basi flavo-fulvescentibus; ano albo. *Mas*, supra flavescens; thorace inter alas abdominisque cingulis duobus subnigris.

Apis Latreillella, *Kirby, Mon. Ap. Angl.* ii. 330. 84 ♂, *and type in Cab. Ent. Soc. Lond.*
Apis Tunstallana, *Kirby, Mon. Ap. Angl.* ii. 346. 94 ♀, *and type in Cab. Ent. Soc. Lond.*
Bombus Latreillellus, *Illig. Mag.* v. 165. 11 ♂.
Dahlb. Bomb. Scand. p. 39. 14 ♂.
Drews. & Schiödte, Kröy. Tidsskr. ii. 120. 16 ♂.
Nyland. Ap. Boreal. p. 234. 18 ♂.
Smith, Cat. Brit. Hym. p. 103. 10 ♂ ♀.
Nyland. Revis. Ap. Boreal. p. 261. 4.
Bombus Tunstallanus, *Drews. & Schiödte, Kröy. Tidsskr.* ii. 119. 14 ♀.
Nyland. Ap. Boreal. p. 231. 10.

Female. Length 10 lines.—The pubescence black, that on the collar and scutellum of a fulvous-yellow; the basal segment of the abdomen has on each side a little fulvous-yellow pubescence; the apical margin of the third segment, and the fourth and fifth have a little white pubescence, the apical one naked above; the apical margin of the second segment has usually an obscure mixture of pale hairs; beneath, the third, fourth and fifth segments are fringed with pale pubescence. B.M.
Var. β. The base of the abdomen with an entire fascia of fulvous-yellow pubescence.
Var. γ. The base of the abdomen black.

Worker. Length 5–7 lines.—The pubescence black, the collar has a fulvous-yellow band, the scutellum only an obscure yellow fringe; the abdomen white at the apex, the second and third segments have a more or less conspicuous white fringe. B.M.

Male. Length 6–8 lines.—The pubescence on the head black; the face has sometimes an obscure mixture of pale hairs. Thorax: above yellow, having a broad black fascia between the wings; the sides usually obscurely cinereous. Abdomen: the pubescence yellow, the second and third segments with a band of black pubescence at their base, the second usually narrowest;

the sixth segment has a mixture of black pubescence in the middle. B.M.

Var. β. The black fasciæ on the abdomen subobsolete, the abdomen and thorax beneath subcinereous.

The sexes of this species, particularly the females and workers, are difficult to separate from those of *B. subterraneus*, and offer few characters which can be pointed out, whereby they may be distinguished, and yet the males and females of the two species may be readily separated; the females have a shorter pubescence, and their abdomen has a more or less distinct pale fringe on the second and third segments, and all the individuals obtained from a nest, and also others captured *in coitu*, have the fourth and fifth segments white, unmixed with fuscous hairs, the apex being naked. The variety of the male having the black bands of the abdomen subobsolete, approaches very closely to *B. fragrans*, but the head is broader, and the yellow pubescence is of a lemon tint, not fulvous as in *B. fragrans*. The worker described is from a specimen taken from the nest; sometimes they are nearly black, but retain the indistinct pale fringe on the third and fourth abdominal segments: an anatomical examination proves this male to be quite distinct from every other male known.

This species is not common in the London district, but it is to be found in the neighbourhood of Battersea, Fulham, Wandsworth, and generally to the south of the Thames. At Shoebury, below Southend, it abounds; here I met with its *nidus*, and captured several pairs connected; it is also very abundant on the coast near Brighton, but no examples have been received from the north of England.

18. Bombus subterraneus.

B. hirsutus, ater; thorace antice flavescenti, ano fusco, interdum flavo-nigrescenti.

Apis subterranea, *Linn. Faun. Suec.* p. 425. no. 1718, *and type in Cab. Linn. Soc.*; *Syst. Nat.* i. 961. 51 ♀.
Fabr. Ent. Syst. ii. 322. 37.
Müller, Prodr. Zool. Dan. 165. 1928.
Apis Harrisella, *Kirby, Mon. Ap. Angl.* ii. 373. 110. t. 18. f. 7 ♀, 8 ♂.
Apis soroensis, *Kirby, Mon. Ap. Angl.* ii. 354. 98 (nec *Fabr.*).
Bombus subterraneus, *Fabr. Syst. Piez.* p. 345. 10 ♀.
Dahlb. Bomb. Scand. p. 38. no. 11.
Drews. & Schiödte, Kröy. Tidsskr. ii. 116. 11.

Bombus subterraneus, *Nyland. Ap. Boreal.* p. 239. 27.
Smith, Cat. Hym. Acul. p. 102. 9 ♂ ♀.
Bombus Harrisellus, *Westw. Nat. Libr.* xxxviii. 256. t. 18. f. 1 ♂.
Smith, Zool. ii. 550. 16.
Bombus soroensis, *St. Farg. Hym.* i. 468. 14.
Bombus flavo-nigrescens, *Smith, Zool.* iv. 1556.

Female. Length 9–10 lines.—The pubescence black, the collar having on each side a faint trace of yellow, a similar obscure tinge of yellow on the lateral margins of the scutellum; the apical margin of the third segment of the abdomen and the fourth clothed with fuscous or dirty-white pubescence, on the fifth it is black; beneath, the pubescence is black, towards the apex at the sides it is fuscous. B.M.

Var. β. The collar, scutellum, and sides of the basal segment with bright fulvous-yellow pubescence; the apex of the abdomen white, with a faint yellow tinge.

Var. γ. The lateral margins of the scutellum very faintly tinged with yellow, and the fourth segment of the abdomen obscurely fuscous, with a faint yellow tinge.

Var. δ. Entirely black, except the apex of the abdomen, which is obscurely fuscous.

Var. ε. Totally black.

Worker. Length 5–8 lines.—Differs in no respect from the female, except in size; in colour it undergoes the same variations. B.M.

Male. Length 6–8 lines.—The pubescence black; the collar, scutellum, and basal segment of the abdomen yellow; the fourth, fifth and sixth white; the mandibles bearded with ferruginous hairs. B.M.

The male varies like the other sexes, becoming gradually black, the most common form being that which is described. It is very like the male of *B. hortorum*, from which however it differs in having shorter pubescence, and in being a more compact insect; the pubescence in *B. hortorum* is somewhat ragged; they also differ in having the beard on the mandibles of different colours,—in *B. hortorum* it is black, in *B. subterraneus* it is ferruginous.

The female greatly resembles that of *B. hortorum*, but its abdomen is of a different form, not so triangular, more rounded at the sides and convex above; but that which most easily separates them is the tongue, which in *B. subterraneus* is proportionably shorter. Variety δ. is the *B. soroensis* of St. Fargeau, as appears upon an examination of the typical specimen in Mr. Westwood's collection; it is also the *A. soroensis* of Kirby; the female, when

compared with that of *B. hortorum*, will be seen to have a thicker and coarser pubescence; but only a familiar acquaintance with the *Bombi* will enable the student to discriminate several very distinct species. This insect is not very abundant in the neighbourhood of London, and is only occasionally met with. Mr. Walcott finds it abundantly in the neighbourhood of Bristol, and we are greatly indebted to him for his observations on this insect, and for a fine series of examples presented to the Museum. During the month of August 1853 and 1854 this insect occurred in plenty at Southend, and thus an opportunity of observing it presented itself. I obtained a highly coloured male *in coitu* with the black variety, *A. Harrisella*, Kirby.

Genus 17. APATHUS.

Apis, pt., *Fabr. Ent. Syst.* ii. 317. 11 (1793).
Bombus, pt., *Fabr. Syst. Piez.* 342 (1804).
Bremus, pt., *Jurine, Hym.* p. 257 (1807).
Apathus, *Newm. Ent. Mag.* ii. p. 404 (1834).
Psithyrus, *St. Farg. Hym.* ii. 424 (nec *Hübner*) (1841).

The characters are those of the genus *Bombus*, with the following difference. The posterior tibiæ are destitute of corbiculæ, and are exteriorly convex; the basal joint of the posterior tarsi has no tooth, at its base above; the apex of the abdomen curves under; the apical segment beneath has the lateral margins elevated. The males also have the posterior tibiæ convex externally.

Sexes two, male and female.

1. Apathus rupestris.

A. hirsutus, ater; alis nigricantibus, ano rufo-fulvo.

Apis rupestris, *Fabr. Ent. Syst.* ii. 320. 26 ♀.
Kirby, Mon. Ap. Angl. ii. 369. 108 ♀.
Apis Albinella, *Kirby, l. c.* 361. 104 ♂.
Apis frutetorum, *Panz. Faun. Germ.* 75. 18 ♂.
Fabr. Syst. Piez. p. 350. 38.
Bremus pomorum, *Panz. Faun. Germ.* 75. 18 ♂?
Bombus rupestris, *Fabr. Syst. Piez.* p. 348. 26 ♀.
Latr. Hist. Nat. Ins. xiv. 64. 3.
Psithyrus rupestris, *St. Farg. Hym.* ii. 426. 1.
Drews. & Schiödte, Kröy. Tidsskr. ii. 125. 5.
Curtis, Brit. Ent. x. t. 468.
Nyland. Ap. Boreal. p. 241. 1.

Psithyrus frutetorum, *St. Farg. Hym.* ii. 436. 5 ♂.
Apathus rupestris, *Smith, Zool.* ii. 543. 1 ♂ ♀; *Cat. Brit. Hym.* p. 97. 1.

Female. Length 10 lines.—The pubescence black, the mandibles bearded with black pubescence; the wings deep brown, with a violet iridescence in certain lights; the disk of the abdomen subpubescent, shining; the fourth and two apical segments clothed with rufo-fulvous pubescence; beneath, the basal margins of the segments glossy, smooth and shining, the fifth segment fringed with fulvous hairs. B.M.

Var. β. The collar and scutellum obscurely yellow.

Male. Length 6–7 lines.—The pubescence black; the second segment of the abdomen with a lateral tuft of cinereous pubescence, the four apical segments clothed with rufo-fulvous pubescence; the tarsi and posterior tibiæ fringed with fulvous hairs; the wings fusco-hyaline, the nervures fusco-ferruginous. B.M.

Var. β. The thorax anteriorly has a mixture of cinereous hairs; the first and second segments of the abdomen have a lateral tuft of cinereous pubescence. (*A. Albinella,* Kirby.)

Var. γ. The thorax anteriorly and posteriorly cinereous, the abdomen cinereous at the base. (*A. frutetorum,* Kirby.)

Var. δ. The thorax anteriorly and posteriorly and the basal segment of the abdomen covered with cinereous pubescence; the second and following segments have fulvous pubescence.

The variety of the female has not occurred in this country, but it is met with on the continent; it is probably the *Apis arenaria* of Panzer. Of the male, var. β. is the *A. Albinella* of Kirby, var. γ. the *A. frutetorum* of Panzer, and var. δ. probably the *A. pomorum* of that author; the latter variety is rare. The species is occasionally met with in the London district, but it is not abundant. The female once occurred in great numbers at Coomb Wood, Surrey: the males are frequently met with, and below Southend they have been observed in profusion in the month of August: this species is probably the parasite of *B. lapidarius.*

2. Apathus campestris.

A. hirsutus, ater; thorace antice, scutello anoque flavis; abdominis apice acuminato inflexo.

Apis campestris, *Panz. Faun. Germ.* 74. 11 ♀.
Kirby, Mon. Ap. Angl. ii. 335. 88. t. 18. f. 2.

Apis Rossiella, *Kirby, l. c.* ii. 331. 85. t. 18. f. 1 ♂.
Apis Francisana, *Kirby, l. c.* ii. 334. 87 ♂.
Apis Leeana, *Kirby, l. c.* ii. 333. 86 ♂.
Apis subterranea, *Kirby, l. c.* ii. 371. 109 ♂.
Bombus campestris, *Fabr. Syst. Piez.* p. 344. 7 ♀.
Illig. Mag. v. 173. 78.
Dahlb. Bomb. Scand. p. 51. 34.
Bombus Francisanus, *Illig. Mag.* v. 165. 14 ♂.
Bombus Rossiellus, *Dahlb. Bomb. Scand.* 40. 15 ♂.
Psithyrus Rossiellus, *Drews. & Schiödte, Kröy. Tidsskr.* ii. 123. 1. t. ii. f. *g* ♂.
Psithyrus campestris, *St. Farg. Hym.* ii. 433. 4 ♀.
Drews. & Schiödte, Kröy. Tidsskr. ii. 123. 2.
Psithyrus Francisanus, *Drews. & Schiödte, Kröy. Tidskr.* ii. 125. 4 ♂.
Nyland. Ap. Boreal. p. 241. 2.
Apathus campestris, *Smith, Zool.* ii. 543. 2 ♂ ♀; *Cat. Brit. Hym.* p. 98. 3.

Female. Length 8–9 lines.—The pubescence black; the thorax in front and the scutellum clothed with yellow pubescence; the three basal segments of the abdomen nearly naked in the middle, smooth and shining, having a thin black pubescence, most dense at the sides; the third, fourth and fifth segments clothed with yellow pubescence, more or less interrupted in the middle; the wings fusco-hyaline, slightly clouded at their apex. B.M.

Var. β. The pubescence on the scutellum black.

Var. γ. The pubescence entirely black, having only a few fuscous hairs at the apex of the abdomen.

Male. Length 6–8 lines. — The pubescence golden-yellow; that on the face, cheeks, thorax beneath, and on the legs, black; the thorax has a black band between the wings, widest in the middle of the disk; the second segment of the abdomen clothed with black pubescence; the apical segment fringed with fuscous or black pubescence. (*A. Rossiella*, Kirby.) B.M.

Var. β. The thorax in front yellow, the scutellum obscurely so; the two basal segments of the abdomen have black pubescence, the third and three following have yellow, and the apical segment black pubescence. (*A. Leeana*, Kirby.)

Var. γ. The pubescence entirely black, except the third, fourth and fifth segments laterally, which have a deep yellow pubescence; sometimes only on the fourth and fifth segments. (*A. Francisana*, Kirby.)

Var. δ. The pubescence entirely black, the apex alone being slightly fuscous. (*A. subterranea*, Kirby.)

Var. ε. The thorax in front, the scutellum, and basal segment of the abdomen, the third segment laterally, and the fourth and

following segments having yellow pubescence, the extreme apex black.

Variety β. of the female is not frequently met with, and of var. γ. only two examples are known. Var. ε. of the male is a very common form: possibly other varieties might be enumerated, but they will intervene between β. and ε. This is an abundant insect in many situations; in the London district it is most numerous about Plumstead and Blackheath, being rather scarce to the north of the Thames.

It appears to be widely distributed; examples have been received from Wales and Perthshire; it is probably parasitic upon *Bombus hortorum*.

3. Apathus Barbutellus.

A. hirsutus, ater; thorace antice, scutelloque, fulvis; abdomine subgloboso, ano albo.

Apis Barbutella, *Kirby, Mon. Ap. Angl.* ii. 343. 93. t. 18. f. 4 ♂.
Psithyrus quadricolor, *St. Farg. Hym.* ii. 428. 2 ♂.
Apathus Barbutellus, *Smith, Zool.* ii. 543. 3; *Cat. Brit. Hym.* p. 99. 4.

Female. Length 7–9 lines.—The pubescence black; the thorax anteriorly, the margin of the vertex, and the posterior margin of the scutellum have a fulvous-yellow pubescence; the wings fuscous, the nervures nigro-piceous. Abdomen subglobose, very convex above, shining, the pubescence sparing on the three basal segments, that on the basal one intermixed with yellow; the fourth and fifth segments with white pubescence. B.M.

Var. β. The scutellum and basal segment with black pubescence.

Male. Length 6–7 lines.—The pubescence black; the posterior margin of the vertex, the thorax anteriorly, and the margin of the scutellum have yellow pubescence; the abdomen subglobose, the two basal segments shining, the base with a thin yellow pubescence, that on the third, fourth, and lateral margins of the fifth, yellowish-white; that on the fifth and basal margin of the sixth black, the apex fulvous. B.M.

Var. β. The pubescence on the scutellum entirely black.

This species is very abundant; it is parasitic upon *B. pratorum*. Mr. Walcott bred a number from the nest of that bee, and during the autumn of 1854 I myself obtained it from the nidus of the same insect. I suspect a difficulty has arisen in the discrimina-

tion of this species, in consequence of Kirby using the terms "abdomen subtriangular" and "anus albus;" the latter is fulvous, which in worn examples becomes white. I have used the term subglobose in describing the abdomen of the male, and although strictly it is subtriangular, still, in contradistinction to the male of *A. campestris*, it is subglobose, and will serve as a distinction between them.

This bee occurs in great profusion in Yorkshire; it also occurs in Scotland, and is not rare in the London district.

4. Apathus vestalis.

A. hirsutus, ater; thorace antice fulvo-flavo, ano albo, apice nigro.

Apis vestalis, *Fourc. Ent. Par.* ii. 450. 27.
Kirby, Mon. Ap. Angl. ii. 347. 95. t. 18. f. 3 ♀ (f. 4. nec ♂).
Apis nemorum, *Syst. Piez.* p. 345. 8 ?, *and Cab. Banks. Linn. Soc.*
Bremus æstivalis, *Panz. Faun. Germ.* 89. 16.
Bombus vestalis, *Latr. Hist. Nat. Ins.* xiv. 65. 9.
Dahlb. Bomb. Scand. p. 51. 34.
Illig. Mag. v. 174. 60.
Psithyrus vestalis, *St. Farg. Hym.* ii. 430. 3.
Psithyrus æstivalis, *Drews. & Schiödte, Kröy. Tidsskr.* ii. 124. 3 ♀.
Nyland. Ap. Boreal. p. 241. 3.
Psithyrus Rossiellus, *Drews. & Schiödte, Kröy. Tidsskr.* ii. 123. 1 ♂.
Nyland. Ap. Boreal. p. 242. 5.
Apathus nemorum, *Smith, Zool.* ii. 544. 4 ♂ ♀.

Female. Length 10 lines.—The pubescence black, the thorax having anteriorly a broad reddish-yellow band. Abdomen shining, the pubescence sparing on the second segment in the middle; the third has on each side a yellow pubescence, obliquely narrowing to the middle of the segment; the fourth and fifth have white pubescence, intermixed in the middle on the fifth with fuscous hairs; the sixth naked, having a little very short ferruginous pubescence at the apex. B.M.

Male. Length 7–8 lines.—The pubescence black, the thorax having a yellow band as in the other sex; the tegulæ and nervures rufo-piceous; wings subhyaline, their apical margins faintly clouded; the basal segment of the abdomen having a thin yellow pubescence, also a few yellow hairs on the scutellum; the third segment having yellow pubescence, disposed as in the other sex; the fourth and apical segments clothed with white pubescence, that at the extreme apex fuscous. B.M.

Var. β. The pubescence on the scutellum black, the base of the abdomen having some yellow pubescence laterally.
Var. γ. The pubescence on the scutellum and at the base of the abdomen entirely black.

The insect which represents the *Bombus nemorum* in the Banksian Cabinet is the *A. vestalis*, but it has been thought better to retain Kirby's name, since no female of this species has occurred with the character "thorace fascia interrupta flava;" nor is it the case with the specimen in the Banksian Collection, which is probably not the typical one.

This species is found in all parts of the United Kingdom, and is very abundant in the neighbourhood of London. Both sexes of this parasite were found in the nest of *B. terrestris* at Southend, in the autumn of 1854.

Genus 18. APIS.

Apis, pt., *Linn.*

Communities consisting of three kinds of individuals,—males, females, and workers.

Males.—Eyes very large, occupying one-fifth of the head, meeting on the vertex; the posterior tibiæ slender at the base, gradually widening to the apex.

Females and Workers.—Eyes lateral, elongate, not meeting on the vertex. Wings having one marginal and three submarginal cells; the labial palpi four-jointed, the maxillary palpi consisting of a single joint. Eyes pubescent; posterior tibiæ not having any spine at the apex; the basal joint of the posterior tarsi of the workers concave, transversely ridged, each ridge having a thick-set fringe of stiff hairs, producing the appearance of transverse grooves. The female and the male have the tarsi simple.

Volumes have been written on the economy of the Honey Bees; Swammerdam, Reaumur, Huber, and others have made us acquainted with the marvels of the hive. Not having had an opportunity of making any personal observations on the Hive-bee, I can add nothing to its history.

We can scarcely estimate the value the products of the hive must have been to man in ancient times; but when we remember that honey must have formed the staple commodity

which our forefathers applied to all the uses for which sugar is now substituted, and at the same time recollect even the present value of the wax, we shall arrive at a considerable estimate of the benefits derived from these industrious insects.

In the entire range of the history of bees, nothing is to be met with which excites our astonishment so greatly as the manner in which the Hive-bee is said to possess the power of replacing the loss of their queen; indeed, so contrary is this to all our experience, that without a personal confirmation of so remarkable a phænomenon, some feeling of incredulity will force itself upon the mind, and suggest the possibility of mistaken observation. If the only thing necessary to produce difference of sex is difference of aliment, there must be some misconception or error in speaking of eggs of males, workers, and females. No difference is to be observed in the food of the solitary species of Hymenoptera; the larvæ of the sexes of the genus *Pompilus* feed upon spiders, Diptera, or caterpillars: one undeviating course is to be observed: the larvæ of both sexes of *Melittobia* alike feed on that of *Anthophora*; the eggs deposited nearest to the entrance of a burrow invariably produce males, which are the first which come forth: this does not appear to be dependent either upon the quality or quantity of food, but upon a pre-existent organization existing in the egg itself. If the phænomenon above alluded to be a deviation from the laws which our observations have led us to adopt, it is then a circumstance arising from laws and principles which are too inscrutable for the limited powers of perception with which we are endowed.

Further observations on the wonders of the hive must be abstained from,—a mere sketch would fill a volume, and it is only necessary to call attention to the list of illustrious names of writers on the hive and its inhabitants, given by Mr. J. O. Westwood in the second volume of his admirable Introduction to the Classification of Insects.

It might be well to record a fact in confirmation of Huber's opinion, that the female, or queen, is impregnated in the open air. A person who kept bees was one day walking in his garden, when suddenly he saw a couple of bees fall to the ground on the pathway; these he observed were in connexion; having secured them in this condition, he forwarded them to me; they were separated, but the male was dead. The young queen was of a pale fuscous colour, yellow beneath, the legs also being pale yellow; she was scarcely larger than an ordinary working bee.

There appears to be some reason for believing that the hive-bee of this country has from the remotest ages been scattered over most parts of the old world; in the present day it is a cosmopolitan.

1. Apis mellifica.

Apis mellifica, *Linn. Faun. Suec.* 1697.
Scop. Ent. Carn. p. 811.
Fabr. Syst. Ent. p. 383. 30.
Sulz. Ins. t. 19. f. 123.
Harris, Expos. Eng. Ins. t. 39. f. 9, 10.
Schrank, Ins. Austr. p. 813.
Rossi, Faun. Etrusc. ii. 103. 912.
Christ. Hym. p. 73. t. 1. f. 1–5.
Don. Brit. Ins. xiv. 63. 492.
Kirby, Mon. Ap. Angl. ii. 312. 73. t. 17. f. 10, 11, 12.
Panz. Faun. Germ. 85. 16. t. 17, 18.
Latr. Hist. Nat. xiv. 66. 1.
Spin. Ins. Lig. fasc. i. 35. 15.
Jurine, Hym. p. 244. t. 12. gen. 35.
Curtis, Brit. Ent. xvi. 769. ♂ ♀ ☿.
Brullé, Expéd. Sc. de Morée, iii. 327. 728.
St. Farg. Hym. i. 401. 1.
Lucas, Explor. Sc. Algér. iii. 141. 1.
Nyland. Ap. Boreal. p. 226. 1.
Spin. Faun. Chili. vi. 161. 1.
Apis cerifera, *Scop. Ann. Hist. Nat.* iv. 16. 16.
Apis gregaria, *Geoff. Ins.* ii. 407. 1.
Apis domestica, *Ray, Hist. Ins.* p. 240.
Reaum. Ins. v. t. 22. f. 1 ☿, f. 2 ♂, f. 4 ♀.
Swamm. Bibl. Nat. t. 17. f. 1, 2 ☿, f. 3 ♀, f. 4 ♂.

Female. Length 7–8 lines. — Fuscous, the pubescence rufo-fuscous, that on the vertex fuscous; the antennæ, labrum and mandibles rufo-testaceous; the posterior tibiæ and tarsi pale rufo-testaceous; the wings shorter than the body; the margins of the segments of the abdomen more or less rufo-testaceous. B.M.

Worker.—Closely resembling the female, but uniformly of a darker colour, the legs being concolorous; the wings as long as the body. B.M.

Male. Length 8 lines.—Robust; coloured as in the worker, the eyes ferruginous and approximate; the head narrower than the thorax, the latter as well as the base of the abdomen thickly covered with short rufo-fuscous pubescence, palest on the abdomen and metathorax; the fourth and apical segments have a long thin fuscous pubescence; the apex inflexed, the seventh segment concealed. B.M.

EXPLANATION OF THE PLATES.

All the drawings of the tongues were made from specimens of those organs when recently extracted from fresh specimens of the Bees, before any of the parts became distorted by shrivelling up, as is the case in dried specimens.

The letters indicate the same parts in all the figures; they are as follows: *a*, the mentum; *b*, labium; *c*, the labial palpi; *d*, the paraglossæ; *e*, the maxilla; *f*, the lobe of the maxilla; *g*, the maxillary palpus.

PLATE A.—Fig. 1.

a. The costal nervure.
b. The apical margin.
c. The posterior margin.
d. The post-costal nervure.
e. The externo-medial nervure.
f. The anal nervure.
g. The transverso-medial nervure.
h. The radial nervure.
i. The cubital nervure.
k. The discoidal nervure.
l. The subdiscoidal nervure.
m. The transverso-medial nervures.
n. The recurrent nervures.
o. The stigma.

PLATE A.—Fig. 2.

1. The costal cell.
2. The externo-medial cell.
3. The interno-medial cell.
4. The anal cell.
5. The marginal cell.
6. The first submarginal cell.
7. The second submarginal cell.
8. The third submarginal cell.
9. The fourth submarginal cell.
10. The first discoidal cell.
11. The second discoidal cell.
12. The third discoidal cell.
13. The first apical cell.
14. The second apical cell.

PLATE I.

Fig.
1. *Prosopis cornuta* ♀.
1*a*. Antenna of *Prosopis cornuta* ♂.
1*b*. Intermediate leg of *Prosopis cornuta* ♂.
1*c*. Wing of *Prosopis*.
1*d*. Head of *Prosopis dilatata* ♂.
2. *Sphecodes fuscipennis* ♀.

Fig.
3. *Halictus sexnotatus* ♀.
3*a*. Labrum of *Halictus* ♂.
3*b*. Labrum of *Halictus* ♀.
3*c*. Wing of *Halictus*.
4. *Macropis labiata* ♀.
5. *Nomada armata* ♀.
6. *Dasypoda hirtipes* ♀.
6*a*. Wing of *Dasypoda*.

PLATE II.

1. *Andrena ferox* ♂.
2. *Andrena ferox* ♀.
2*a*. Wing of *Andrena*, first type of neuration.
2*b*. Wing of *Andrena*, second type of neuration.
3. Wing of *Cilissa*.
4. *Panurgus calcaratus* ♂.
4*a*. Wing of *Panurgus*.
5. *Cœlioxys Vectis* ♀.
6. *Megachile maritima* ♂.
6*a*. Anterior tarsus of *Megachile maritima* ♂.
7. Anterior tarsus of *Megachile Willughbiella* ♂.
8. Anterior tarsus of *Megachile circumcincta* ♂.

PLATE III.

1. *Osmia pilicornis* ♂.
2. *Osmia pilicornis* ♀.
3. *Melecta luctuosa* ♀.
4. Apical segment of *Megachile pyrina* ♂.
5. Apical segment of *Megachile argentata* ♂.
6. Apical segment of *Megachile centuncularis* ♂.
7. Apical segment of *Megachile ligniseca* ♂.
8. Apical segment of *Osmia pilicornis* ♂.
9. Apical segment of *Osmia aurulenta* ♂.
10. Profile of the abdomen of *Osmia spinulosa* ♂.
11. Apical segment of *Osmia spinulosa* ♂.
12. Wing of *Cœlioxys*.
13. Wing of *Anthidium*.
14. Wing of *Nomada*.
15. Wing of *Melecta*.
16. Wing of *Stelis*.
17. Wing of *Megachile*.

PLATE IV.

Fig.
1. *Anthidium manicatum* ♂.
2. *Chelostoma florisomne* ♀.
2*a*. Mandible of *Chelostoma florisomne* ♀.
2*b*. Labrum of *Chelostoma florisomne* ♂.
2*c*. Apical segment of *Chelostoma florisomne* ♂.
2*d*. Profile of the abdomen of *Chelostoma florisomne* ♂.

Fig.
3. *Stelis octomaculata* ♀.
4. *Saropoda bimaculata* ♂.
4*a*. Face of *Saropoda bimaculata* ♀.
5. *Ceratina cærulea*.
5*a*. Wing of *Ceratina*.
6. Wing of *Saropoda*.
7. Wing of *Eucera*.
*8. Wing of *Ammobates*.

PLATE V.

1. *Epeolus variegatus* ♀.
2. Hermaphrodite. — *Anthophora acervorum*.
2*a*. Under side of the Hermaphrodite.
3. *Bombus lapponicus* ♀.
4. *Apathus vestalis* ♀.
5. Wing of *Apis mellifica*.
6. Wing of *Anthophora*.
7. Posterior leg of *Apis mellifica* ♀.
8. Posterior leg of *Apis mellifica* ☿.
9. Labrum of *Bombus terrestris* ♀.
10. Labrum of *Apathus campestris*.
11. Posterior leg of *Bombus* ♀.
12. Posterior leg of *Apathus* ♀.

PLATE VI.

1. Labium of *Colletes Daviesana* ♀.
2. Maxilla of *Colletes Daviesana* ♀.
3. Labium of *Sphecodes gibbus* ♀.
4. Maxilla of *Sphecodes gibbus* ♀.
5. Labium of *Prosopis signata* ♀.
6. Maxilla of *Prosopis signata* ♀.
7. Labium of *Halictus leucozonius* ♀.
8. Maxilla of *Halictus leucozonius* ♀.
9. Labium of *Andrena labialis* ♀.
10. Maxilla of *Andrena labialis* ♀.
11. Posterior leg of *Andrena atriceps* ♀.
12. Labium of *Macropis labiata* ♀.
13. Maxilla of *Macropis labiata* ♀.

* The genus *Ammobates* is not described in this work; it is reported to have been taken in England, but the circumstance requires confirmation.

PLATE VII.

Fig.
1. Labium of *Cilissa leporina* ♀.
2. Maxilla of *Cilissa leporina* ♀.
3. Labium of *Dasypoda hirtipes* ♀.
4. Maxilla of *Dasypoda hirtipes* ♀.
5. Labium of *Panurgus Banksianus* ♀.
6. Maxilla of *Panurgus Banksianus* ♀.

Fig.
7. Labium of *Megachile maritima* ♀.
8. Maxilla of *Megachile maritima* ♀.
9. Mandible of *Megachile maritima* ♀.
10. Antenna of *Megachile maritima* ♀.
11. Labium of *Osmia bicornis* ♀.
12. Maxilla of *Osmia bicornis* ♀.

PLATE VIII.

1. Labium of *Anthidium manicatum* ♀.
2. Maxilla of *Anthidium manicatum* ♀.
3. Mandible of *Anthidium manicatum* ♀.
4. Labium of *Chelostoma florisomne* ♀.
5. Maxilla of *Chelostoma florisomne* ♀.
6. Labial palpus of *Heriades truncorum* ♀.
7. Mandible of *Chelostoma florisomne* ♀.
8. Labrum of *Chelostoma florisomne* ♀.
9. Labium of *Nomada sexfasciata* ♀.
10. Maxilla of *Nomada sexfasciata* ♀.
11. Labrum of *Nomada sexfasciata* ♀.
12. Labium of *Ceratina cærulea* ♀.
13. Maxilla of *Ceratina cærulea* ♀.
14. Labium of *Epeolus variegatus* ♀.
15. Maxilla of *Epeolus variegatus* ♀.
16. Labium of *Stelis phæoptera* ♀.
17. Maxilla of *Stelis phæoptera* ♀.

PLATE IX.

1. Labium of *Cœlioxys* ♀.
2. Maxilla of *Cœlioxys* ♀.

2*a*. Labrum of *Cœlioxys* ♀.

2*b*. Superior plate of the apical segment of *C. rufescens* ♀.

2*c*. Inferior plate of the apical segment of *C. rufescens* (typical form) ♀.

2*d*. Inferior plate of the apical segment of *C. rufescens* (variety) ♀.

PLATE IX. (continued.)

Fig.
2*e*. Lateral view of the apical segment of *Cœlioxys rufescens* ♀.
2*f*. Lateral view of the apical segment of *C. rufescens* ♂.
2*g*. Inferior plate of the apical segment of *C. mandibularis* ♀.
2*h*. Under side of the head of *C. mandibularis* ♀.
2*i*. Lateral view of the apical segment of *C. Vectis* ♀.
2*k*. Lateral view of the apical segment of *C. Vectis* ♂.
2*l*. Superior plate of the apical segment of *C. Vectis* ♀.
2*m*. Inferior plate of the apical segment of *C. Vectis* ♀.
2*n*. Inferior plate of the apical segment of *C. Vectis* (variety) ♀.
2*o*. Inferior plate of the apical segment of *C. quadridentata* ♀.
2*p*. Superior plate of the apical segment of *Cœlioxys quadridentata* ♀.

Fig.
2*q*. Lateral view of the apical segment of *Cœlioxys quadridentata* ♀.
2*r*. Inferior plate of the apical segment of *C. umbrina* ♀.
2*s*. Superior plate of the apical segment of *C. umbrina* ♀.
2*t*. Superior plate of the apical segment of *C. simplex* ♀.
2*u*. Inferior plate of the apical segment of *C. simplex* ♀.
2*w*. Lateral view of the apical segment of *C. simplex* ♀.
3. Labium of *Melecta punctata* ♀
4. Maxillary palpus of *Melecta punctata* ♀.
5. Labium of *Eucera longicornis* ♀.
6. Maxilla of *Eucera longicornis* ♀.
7. Labium of *Saropoda bimaculata* ♀.
8. Maxilla of *Saropoda bimaculata* ♀.

PLATE X.

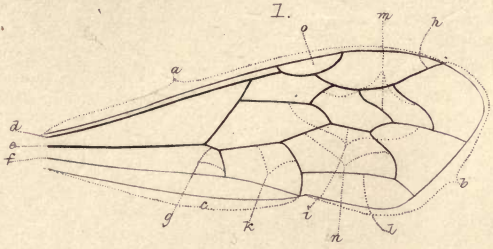
1. Labium of *Anthophora acervorum* ♀.
2. Maxilla of *Anthophora acervorum* ♀.
3. Labium of *Bombus hortorum* ♀.
4. Labium of *Apis mellifica* ♀.
5. Labium of *Bombus terrestris* ♀.
6. Maxilla of *Bombus terrestris* ♀.
7. Maxillary palpus of *Bombus lapidarius* ♀.
8. Maxillary palpus of *Bombus Derhamellus* ♀.

PLATE X. (continued.)

Fig.
9. Labium of *Apathus campestris* ♀.
10. The relative proportions of the labium and labial palpi of *Bombus lapidarius*.

Fig.
11. The relative proportions of the labium and labial palpi of *Bombus Derhamellus* ♀.

1.



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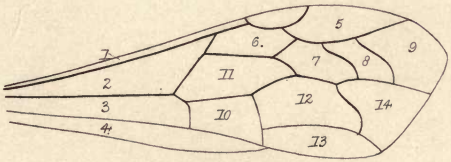
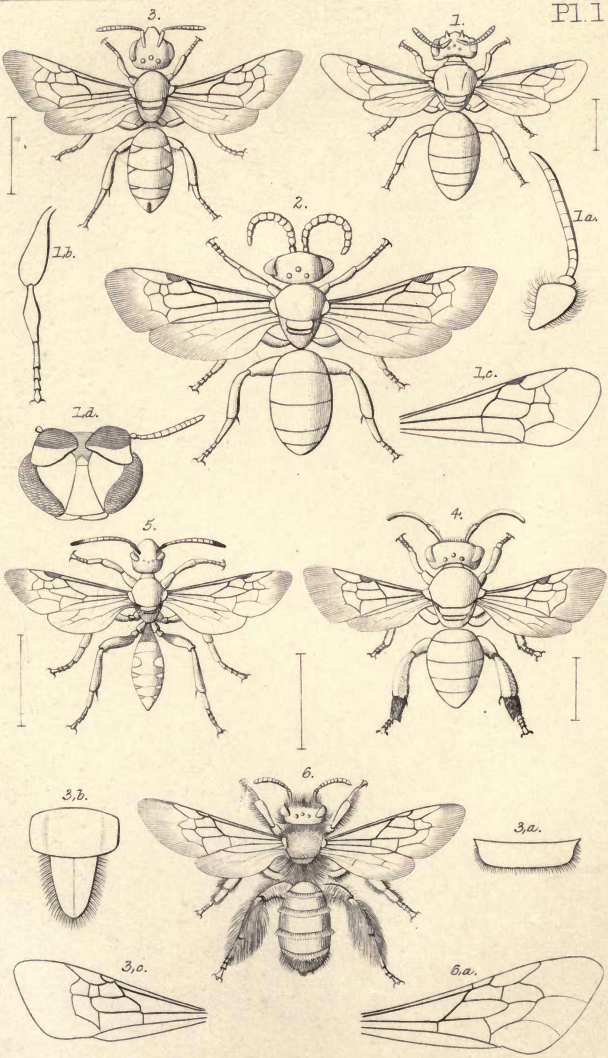
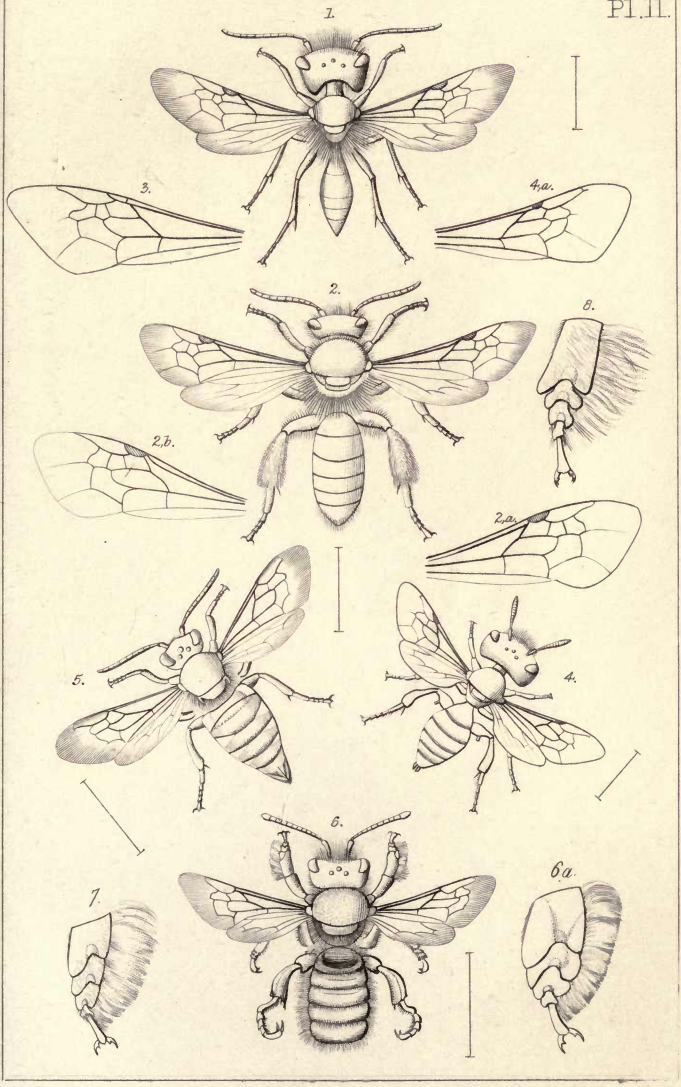


HYMENOPTERA.

Pl. 1.

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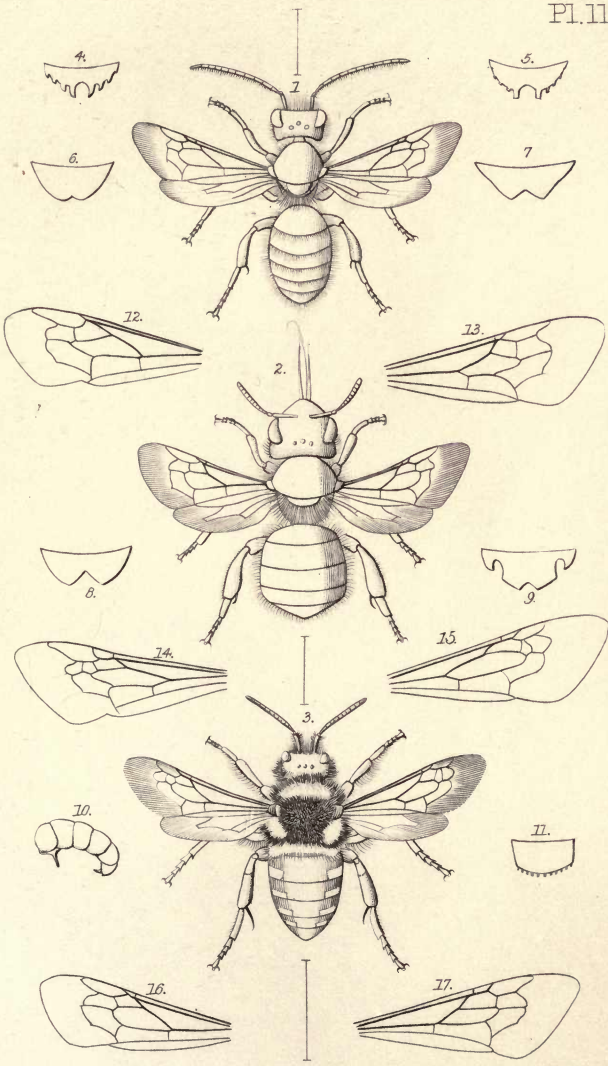
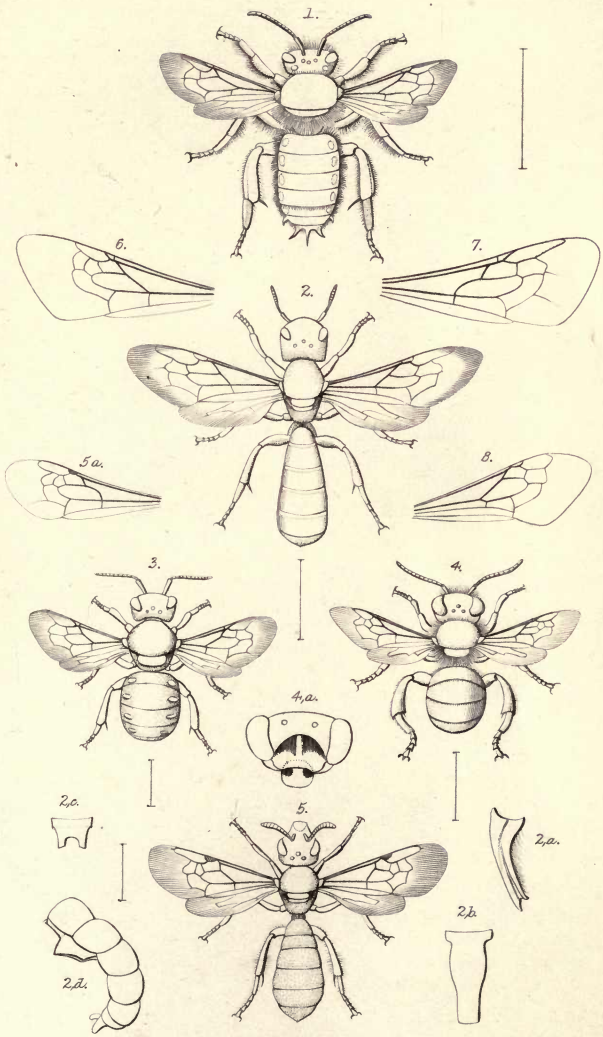
3.
4,a.
2.
8.
2,b.
2,a.
5.
4.
6.
6,a.
7.

Pl. III.




1.
6.
7.
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4.
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2,c.
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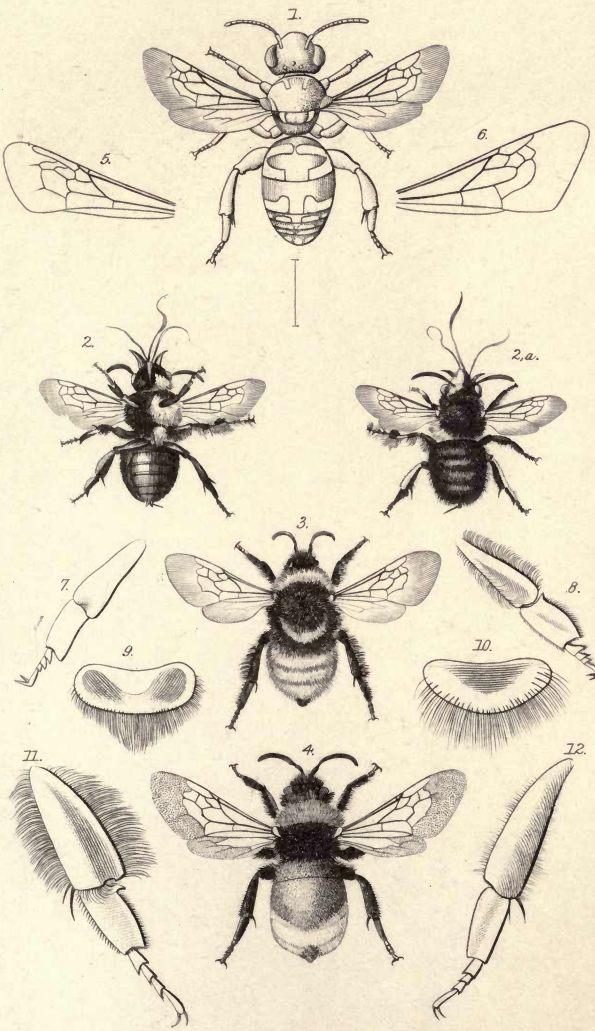
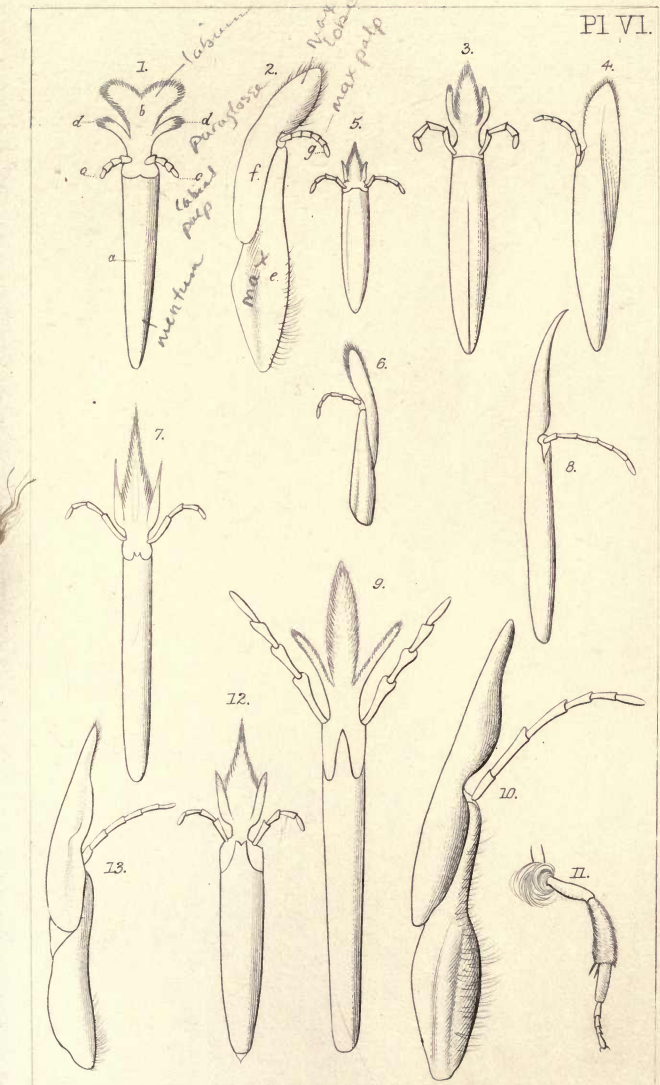
2,b.
2,d.

Pl. V.



Pl VI.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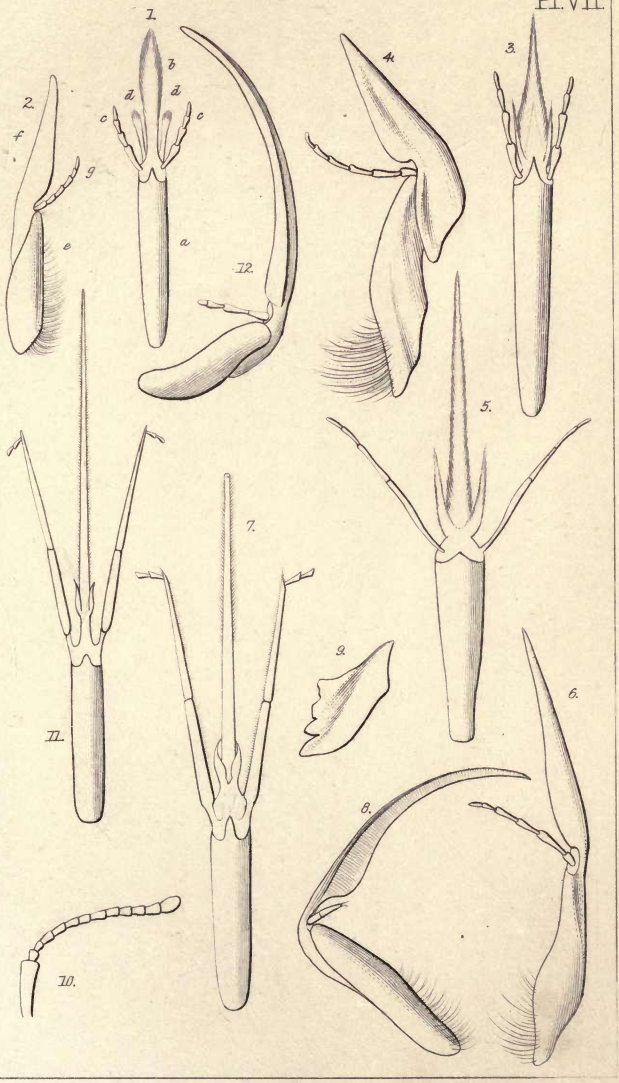
Pl. VII.



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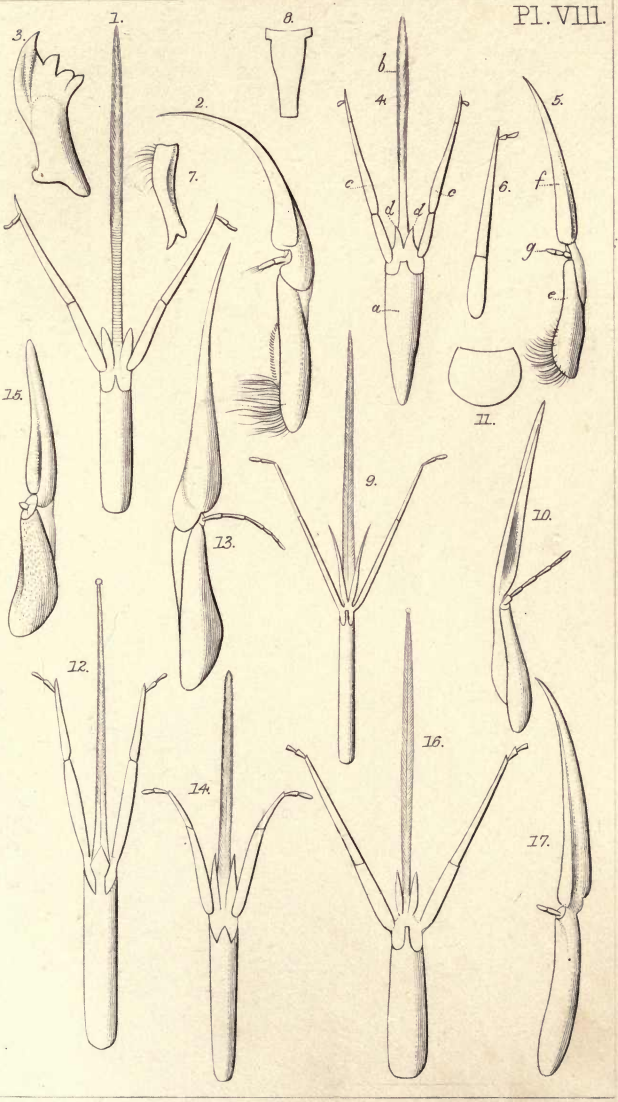
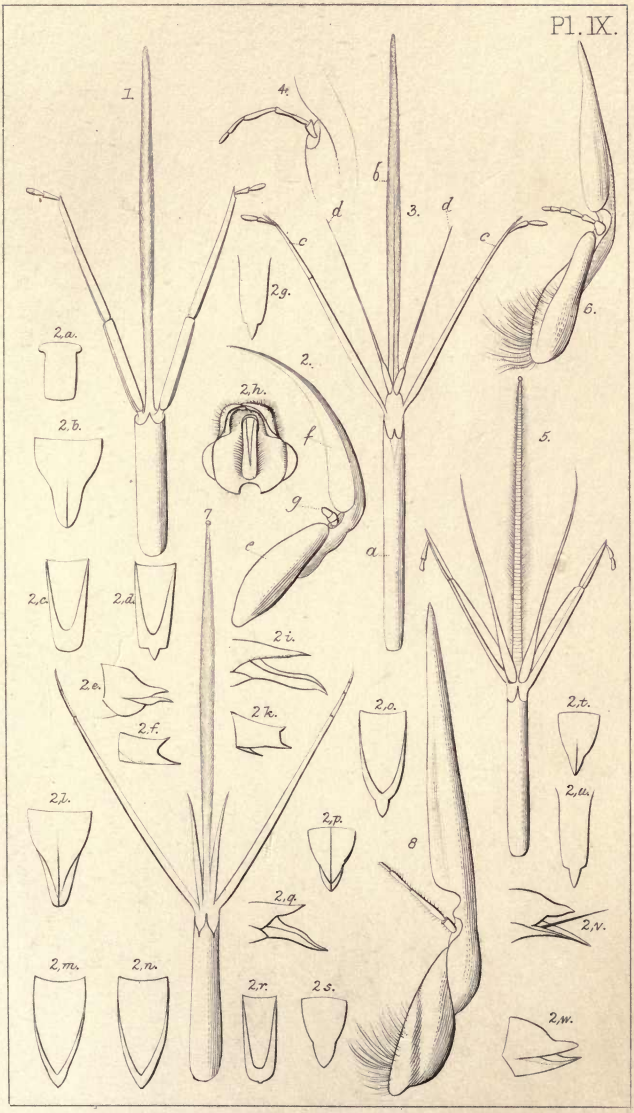


Pl. IX.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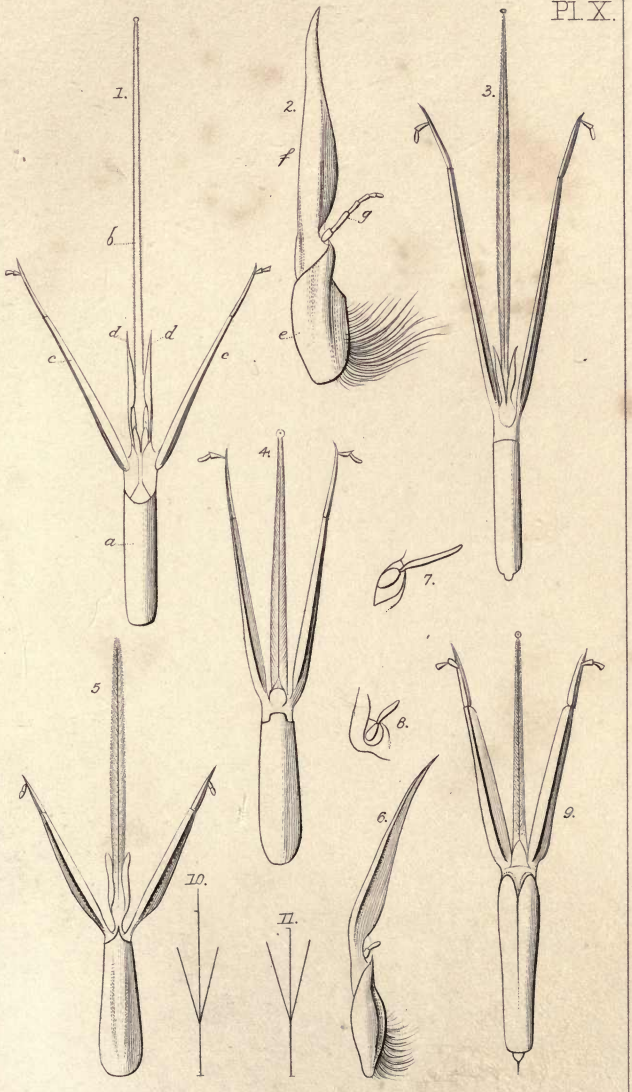

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